Steese Highway/Johansen Expressway
Area Traffic Improvements
Project Number: 61422
Fairbanks, Alaska

TRAFFIC STUDY

Prepared for:
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Northern Region
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NOTICE TO USERS

This report is intended to document the methodologies, findings, and conclusions of a Traffic Study completed for the Alaska Department of Transportation & Public Facilities (DOT&PF), Northern Region.

The intent of the Traffic Study is to examine existing and future traffic circulation issues surrounding the Bentley Trust commercial property, bounded by and including the Steese Expressway, Johansen Expressway and College Road.

Changes frequently occur during the evolution of the analysis and design processes. Persons who may rely on the information contained in this document should consult with Albert M. L. Beck, P.E. (DOT&PF Project Manager, 907-451-5359) or David Krehmeier, P.E. (Consultant Project Manager, 907-272-5451).

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EXECUTIVE SUMMARY

This report documents the methodologies, findings, and conclusions of a Traffic Study completed for Steese Highway/Johansen Expressway Area Traffic Improvements project. The study included nine roads and 18 intersections in and around the Bentley Trust commercial property in Fairbanks, Alaska.

FINDINGS

Current and future traffic operations were evaluated, and mitigation strategies addressing short and long-term needs were identified.

Existing Traffic Conditions

- Continuous 8-hour traffic and pedestrian counts were performed in 2008. Count data was provided by DOT&PF for four intersections. Nine intersections are signalized and nine intersections are unsignalized.
- Based on the 8-hour traffic counts, peak traffic conditions were determined to occur on a weekday between 4 pm and 6 pm.
- The signalized intersection level-of-service analyses determined that five intersections currently operate at an acceptable level of service (LOS C or better) and four intersections operate below LOS C. See Table 2-4.
- The level of service for critical approaches at unsignalized intersections was determined to vary by location. See Table 2-5.
- The arterial level-of-service analysis (for roads with sufficient data) determined that a majority of the study roads operate at LOS C or worse. The Steese Expressway between Trainor Gate Road and the Johansen Expressway operates at LOS B. See Table 2-6.
- Pedestrian facilities are not present throughout much of the retail area. Pedestrian facilities are located along the Johansen Expressway, College Road, Steese Expressway (partially), and Old Steese Highway (partially).
- Within the study area, a total of 669 collisions were recorded during 2003-2007. Of these collisions, 584 (87%) were intersection related and 85 (13%) occurred in the road segments between intersections.

Future Traffic Conditions

- Traffic volumes for 2020 and 2030 were estimated for roadways and intersections within the project area. Growth rates were based on anticipated development in the area, historic traffic growth, and historic population growth.
- Under anticipated 2020 traffic conditions, the level-of-service analyses determined that eight of the signalized intersections will operate at or below LOS D; the critical approaches at most unsignalized intersections will operate at or below LOS D; and most roadways will operate at or below LOS D. See Tables 4-1 through 4-3.
- Under anticipated 2030 traffic conditions, the level-of-service analyses determined that all signalized intersections will operate below LOS D (seven intersections will operate at LOS F); the critical approaches at most unsignalized

intersections will operate at or below LOS D; and most roadways will operate at or below LOS F. See Tables 4-4 through 4-6.

CONCLUSIONS

This study developed numerous mitigation strategies that address the needs of the Bentley Trust area road network.

Mitigation Strategies

- Based on the results of the level-of-service analyses, mitigation strategies were developed. The mitigation strategies identified intersection improvements, additional roadways, and additional pedestrian facilities.
- Fifteen strategies were recommended for further consideration. All strategies include pedestrian facilities.

Considerations for Mitigation Strategy Implementation

- Identify an agency with road maintenance powers and secure appropriate agreements prior to implementing mitigation strategies.
- Prepare a long range phasing plan for implementing multiple strategies. This plan should consider locations already in a long range improvement plan.
- The first phase of the plan should implement a strategy (or strategies) that will improve conditions now and support future implementation of other strategies.
- Continue coordinating with area stakeholders such as land owners, agencies, the ARRC, utility companies, etc.

▪ ***Recommendations for Mitigation Strategy Implementation***

The DOT&PF may advance any of the strategies developed in this study based on identified area-wide needs, estimated costs, maintenance considerations, and schedule constraints.

<u>*Interim Implementation*</u>

A project should be initiated as soon as possible that will address delay and congestion at the Steese Highway and Johansen Expressway intersection.

<u>*Near Term Implementation*</u>

1. Construct the following strategies to create an alternate access from College Road, provide a continuous east-west corridor through the development area, and link the area to downtown Fairbanks via Illinois Street:
    a. Helmericks Avenue Extension (Figure 35);
    b. Helmericks Avenue & Herb Miller Boulevard Roundabout (Figure 34);
    c. Helmericks Avenue and Old Steese Highway Roundabout (Figure 33); and
    d. College Road & Illinois Street/Bentley Trust Road Roundabout (Figure 31).

    The total estimated cost to implement these strategies ($13,519,780) is within anticipated available funding constraints.

    The ARRC has agreed to permit an additional at-grade crossing as long as maintenance is provided by an agency with road maintenance powers and the liability is assumed by a third party.

A developer in the project area has offered to work with DOT&PF to identify and donate ROW from their area holdings. Donated ROW would support existing development plans.

2. Constructing pedestrian facilities on the Old Steese Highway may also be implemented in the near term. If advanced to construction, funding may be limited for the other near term strategies.

Long Term Implementation

1. Incorporate the Old Steese Highway Realignment into a long range transportation plan to acquire funding. (Figure 38)
2. Incorporate the Johansen Expressway & College Road Roundabout Interchange into a future Johansen Expressway improvement or upgrade project or construct it as an individual project.(Figure 25) Incorporate the College Road & Steese Expressway/Old Steese Highway Roundabouts into a future Old Steese Highway improvement or upgrade project or construct them as an individual project.(Figure_32)

Ongoing Consideration

- As properties adjacent to Bentley Trust Road are developed, require upgrades to Bentley Trust Road (currently a private roadway) be included in either the owner's development plans or consider upgrading the road when implementing the Helmericks Avenue Extension. Prior to allocating or funding projects on this privately owned road, ensure maintenance agreements are in place and legal public access has been obtained.
- If circulation problems persist, implement the circulation improvement strategies.
- Since traffic patterns are expected to change as strategies are implemented, intersection queue lengths should be evaluated in successive design phases. Prior to implementing intersection mitigation strategies, determine traffic queue lengths for the nearest controlled intersections. The final design should provide for adequate queue storage at existing and proposed intersections, and ensure that operations of the proposed strategies are not adversely affected by anticipated queues.

1.0 INTRODUCTION

This report documents the methodologies, findings, and conclusions of a Traffic Study completed for Steese Highway/Johansen Expressway Area Traffic Improvements project. This study was initiated by the State of Alaska Department of Transportation and Public Facilities (DOT&PF), Northern Region through RFP 025-8-1-014.

1.1 Purpose and Need

The purpose of this study is to identify current and anticipated needs for the road network surrounding the Bentley Trust commercial property and recommend mitigation strategies. Recommended strategies are based on the needs identified in this study, and are aimed at improving both vehicular and pedestrian mobility within the project area. This Traffic Study concentrates on a portion of the Fairbanks road network that serves an area known as the Bentley Trust commercial property.

Large tracts of property within and adjacent to Bentley Trust commercial property have experienced a rapid increase in commercial and residential development. Multiple large and small retail stores, as well as services oriented businesses and a residential neighborhood have developed in this area, dramatically increasing traffic volumes (RFP 025-8-1-014). Future development plans will likely consist of business and residential land uses similar to those currently in the area. As development continues in the area, traffic volumes will continue to increase.

1.2 Project Scope

This study evaluates current and future traffic operations, determines current and anticipated improvement needs, evaluates mitigation strategies, and recommends strategies that address short and long-term needs. The scope developed for this study was based upon tasks identified in RFP 025-8-1-014, discussions with DOT&PF staff, and a review of existing and proposed developments. The following roads and intersections were identified for evaluation:

- Roads
  - Steese Expressway (College Road to Johansen Expressway),
  - Old Steese Highway (College Road to Johansen Expressway),
  - College Road (Steese Expressway to Johansen Expressway),
  - Johansen Expressway (College Road to Steese Expressway),
  - Hunter Street,
  - Merhar Avenue,
  - Helmericks Avenue/Seekins Drive,
  - Sadler Way, and
  - Bentley Trust Road (Private).
- Intersections
  - Hunter Street & Merhar Avenue,
  - Merhar Avenue & Herb Miller Boulevard,
  - Merhar Avenue & Old Steese Highway,
  - Helmericks Avenue & Herb Miller Boulevard,
  - Old Steese Highway & Sadler Way,

- Old Steese Highway & Blair Road,
- Old Steese Highway & Bus Barn Road,
- Old Steese Highway & Bentley Trust Road,
- Old Steese Highway & Chace Street,
- Old Steese Highway & College Road,
- Steese Expressway & College Road,
- Steese Expressway & Trainor Gate Road,
- Johansen Expressway & College Road,
- Old Steese Highway & Helmericks Avenue,
- Steese Expressway & Johansen Expressway,
- Old Steese Highway & Johansen Expressway, and
- College Road & Bentley Trust Road.

Key traffic-related issues discussed in this report include:

- Existing traffic conditions during the weekday p.m. peak hour,
- Planned developments and transportation improvements in the study area,
- Trip generation and distribution estimates for anticipated developments,
- Future traffic volumes (incorporating the FMATS TransCAD model),
- Existing and anticipated road network needs, and
- Mitigation strategies that maintain acceptable traffic operations.

This study is intended to evaluate the current and anticipated level-of-service (LOS) of the facilities identified above, and identify mitigation strategies to facilitate anticipated traffic demand. As such, evaluations of vehicular speeds, gaps, and collisions are not included.

1.3 Existing Studies

Several Traffic Impact Analysis (TIA) studies that evaluated land use and effects on traffic patterns have been performed for individual developments in the Bentley Trust area. The results and recommendations of these TIAs are considered in this traffic study. Available TIAs include:

- Northside Business Park Traffic Impact Analysis, 2007,
- Birchwood Homes Second Access Traffic Impact Analysis, 2007,
- Fred Meyer Store #224, Traffic Impact Analysis, 2004,
- Wal-Mart Store #2722-01, Traffic Impact Analysis, 2003; and
- Home Depot, Traffic Impact Analysis, 2001.

2.0 EXISTING CONDITIONS

An evaluation of current land use, existing facilities, and transportation services provides a basis for defining deficiencies and identifying mitigation strategies. The following sections present a summary of the known land uses, facilities, and services pertaining to this study.

The developments, facilities, and transportation services considered in this study are those located within and adjacent to what is known as the Bentley Trust property. The Bentley Trust property is located in northeast Fairbanks and is bounded by the Johansen Expressway on the north, the Old Steese Highway on the east, Bentley Trust

Road on the south, and College Road on the West. Commercial and residential areas adjacent to the Johansen Expressway, College Road, the Old Steese Highway, and the Steese Expressway are also included. The location of the study area and its relation to the surrounding area are shown on Figure 1.

2.1 Land Use and Intensity

Land use in the study area is comprised of both developed and undeveloped commercial parcels. Existing developments within the area consist of large and small retail, home improvement, financial, lodging, and food service businesses. At the time of this study, several parcels remain undeveloped. Current development activities include construction of additional retail, commercial, and service oriented businesses. Additional developments are anticipated to be completed in the near future, and complete development of the area is expected.

Small residential and business developments are located between the Old Steese Highway and the Steese Expressway. Access to the neighborhoods is facilitated by smaller local streets that intersect the Old Steese Highway. Business developments along the Old Steese consist of both strip mall and individual buildings. Large residential neighborhoods are located to the east along Trainor Gate Road and the Steese Expressway.

The Fairbanks North Star Borough (FNSB) has established zoning regulations for the study area. The FNSB zoning classifications for the area are “General Use” (GU-1) and “General Commercial” (GC). The residential areas along the Steese Expressway and Trainor Gate Road are classified “Two-Family Residential” (TF).

The Alaska Railroad Corporation (ARRC) maintains railway ROW encompassing Bus Barn Road, bisecting the project between the Old Steese Highway and College Road. A single ARRC owned parcel is currently leased for school bus parking and storage within the Bentley Trust area.

Utilities located within the project include water, sanitary sewer, telecommunications, and electric. The locations of known utilities in relation to existing ROW is presented in Appendix A

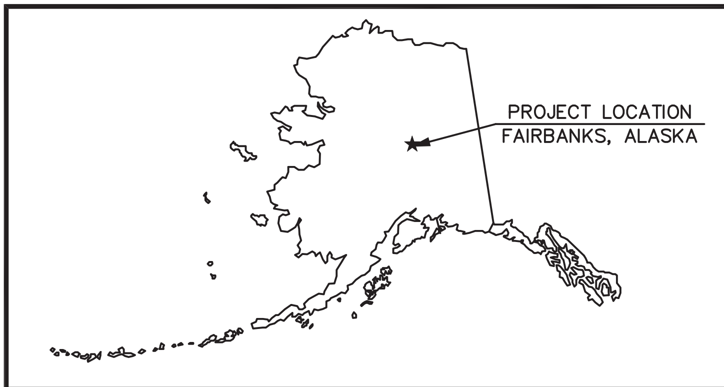

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FIGURE 1

LOCATION & VICINITY MAP

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2.2 Transportation Facilities

Transportation facilities found within the area include roadways, sidewalks and pathways. A summary of the existing transportation facilities is presented in Table 2-1. Roadway classification is based on DOT&PF General Log. Lane configurations and intersection traffic control are shown in Figure 2. Access to the study area is provided by roads and pedestrian facilities located within public right-of-ways (ROW) and maintained by the DOT&PF and City of Fairbanks. Access to businesses adjacent to the public ROW is facilitated by individual driveways. Roads providing circulation within the study area are privately owned and maintained.

Table 2-1 Existing Transportation Facilities

Name	Classification	Cross Section	Speed (mph)	Sidewalks /Pathways	Bicycle Lanes	On-Street Parking
DOT&PF / City of Fairbanks						
Steese Expressway	Urban Other Principal Arterial (FC 14)	Divided 4-Lane	45/55	Separated Pathway	None	None
Old Steese Highway (College to Trainor Gate)	Urban Minor Arterial (FC 16)	5-Lane	35	Sidewalk	None	None
Old Steese Highway (Trainor Gate to Helmericks)	Urban Minor Arterial (FC 16)	3-Lane	35	None	None	None
Old Steese Highway (Helmericks to Johansen)	Urban Minor Arterial (FC 16)	2-Lane	35	None	None	None
College Road	Urban Minor Arterial (FC 16)	4-Lane	35	Sidewalk	None	None
Johansen Expressway	Urban Other Principal Arterial (FC 14)	Divided 4-Lane	55	Separated Pathway	None	None
Trainor Gate Road *(Old Steese to Steese)*	Urban Collector (FC 17)	3-Lane	30	Sidewalk	None	None
Private						
Bentley Trust Road	Urban Local (FC 19)	2-Lane	35	None	None	None
Bus Barn Road	Unclassified	2-Lane (Unpaved)	N/A	None	None	None
Herb Miller Boulevard	Unclassified	2-lane	N/A	None	None	None
Helmericks Ave./Seekins Dr.	Unclassified	3-Lane	N/A	None	None	None
Merhar Avenue	Unclassified	3-Lane	N/A	None	None	None
Hunter Street	Unclassified	4/5-Lane	N/A	None	None	None

Pedestrian facilities include attached sidewalks and separated pathways. Concrete sidewalks are located along both sides of College Road and the Old Steese Highway (between College Road and Trainor Gate Road). A sidewalk is also located along the north side of Trainor Gate Road between the Steese Expressway and the Old Steese Highway. Separated, paved pathways are located along the Steese and Johansen Expressways. Dedicated pedestrian facilities are not provided on the private roads, but pedestrians generally use the paved shoulders along the roadways. Crosswalks with pedestrian signals are provided at all signalized intersections.

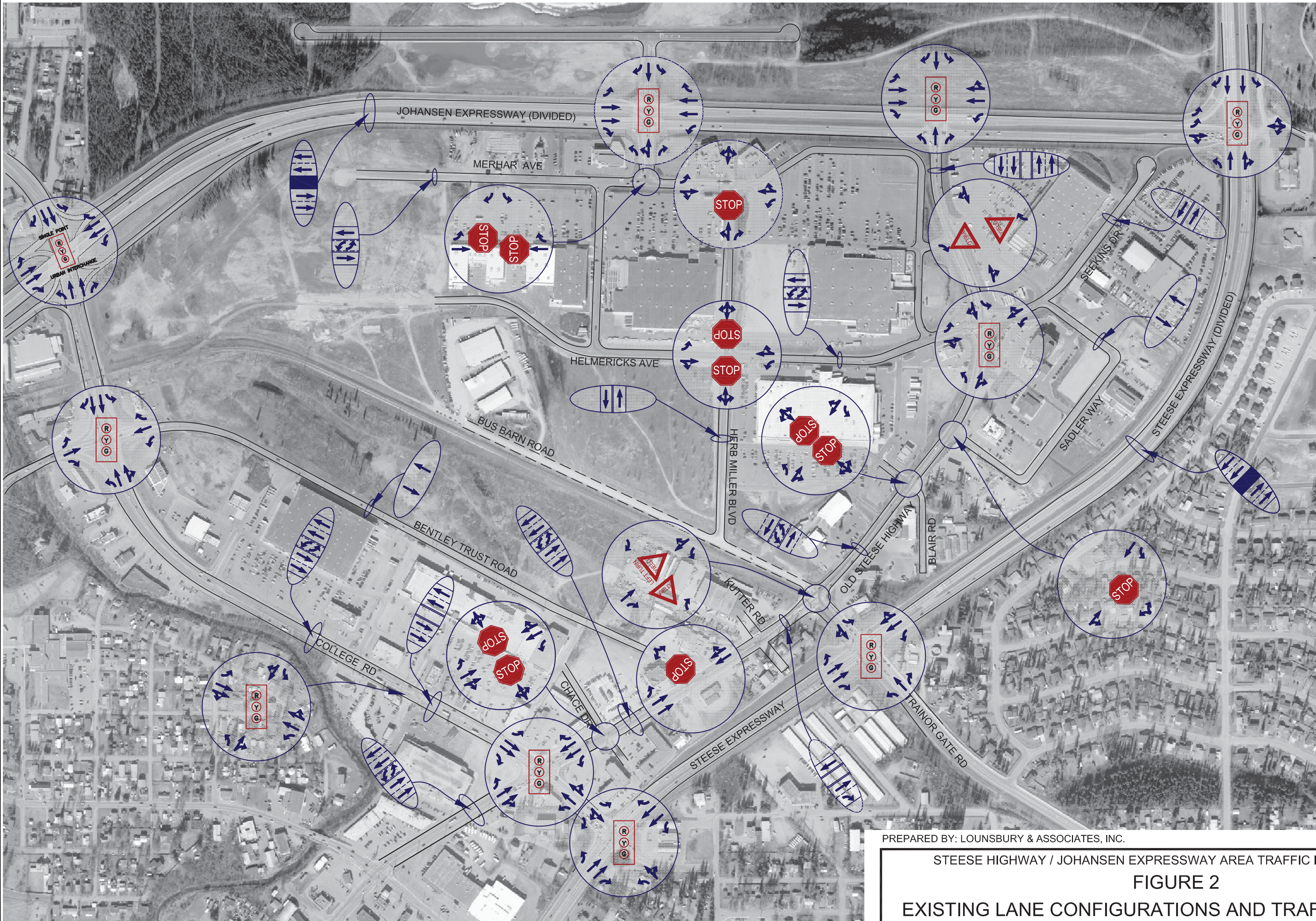

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FIGURE 2

EXISTING LANE CONFIGURATIONS AND TRAFFIC CONTROL

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2.3 Transportation Services

2.3.1 Public Transportation

The FNSB Metropolitan Area Commuter System (MACS) provides transit services throughout the study area. Three routes (Blue Line, Red Line and Purple Line) make regular stops throughout the day within the study area. Stops are generally located at Wal-Mart and Fred Meyer, which allow riders to wait indoors. However, on-street stops are located along the Old Steese Highway near College Road, and a single on-street stop is located on Helmericks near the Old Steese Highway. On-street stops are identified with MACS signs.

2.3.2 School Transportation Services

First Student, Inc. provides school bus service for the FNSB School District. Even though there are no schools located in the study area, First Student's school bus parking and storage facility (also known as the 'Bus Barn') is located on the ARRC owned parcel off of the unpaved Bus Barn Road. School buses frequently traverse the study area using Merhar and Herb Miller Boulevard to access Bus Barn Road. Approximately 110 busses enter and leave the Bus Barn during morning and afternoon times and 25 busses enter and leave during the mid-day hours. The school bus schedule for a typical day (Monday through Friday) is presented in Table 2-2.

Table 2-2 Typical School Bus Schedule

	MORNING	MID-DAY	AFTERNOON
Leave Bus Barn	0530 - 0730	1045 - 1130	1335 - 1430
Return to Bus Barn	0845 - 0930	1215 - 1245	1545 - 1900

2.4 Existing Traffic Counts

Analysis of peak traffic conditions is critical to identifying the needs of any transportation system. Peak traffic conditions are defined as a period of time in which traffic volumes are at their highest. The analysis presented in this study is based on peak traffic conditions occurring during one hour of an average weekday. This time period is called the peak hour.

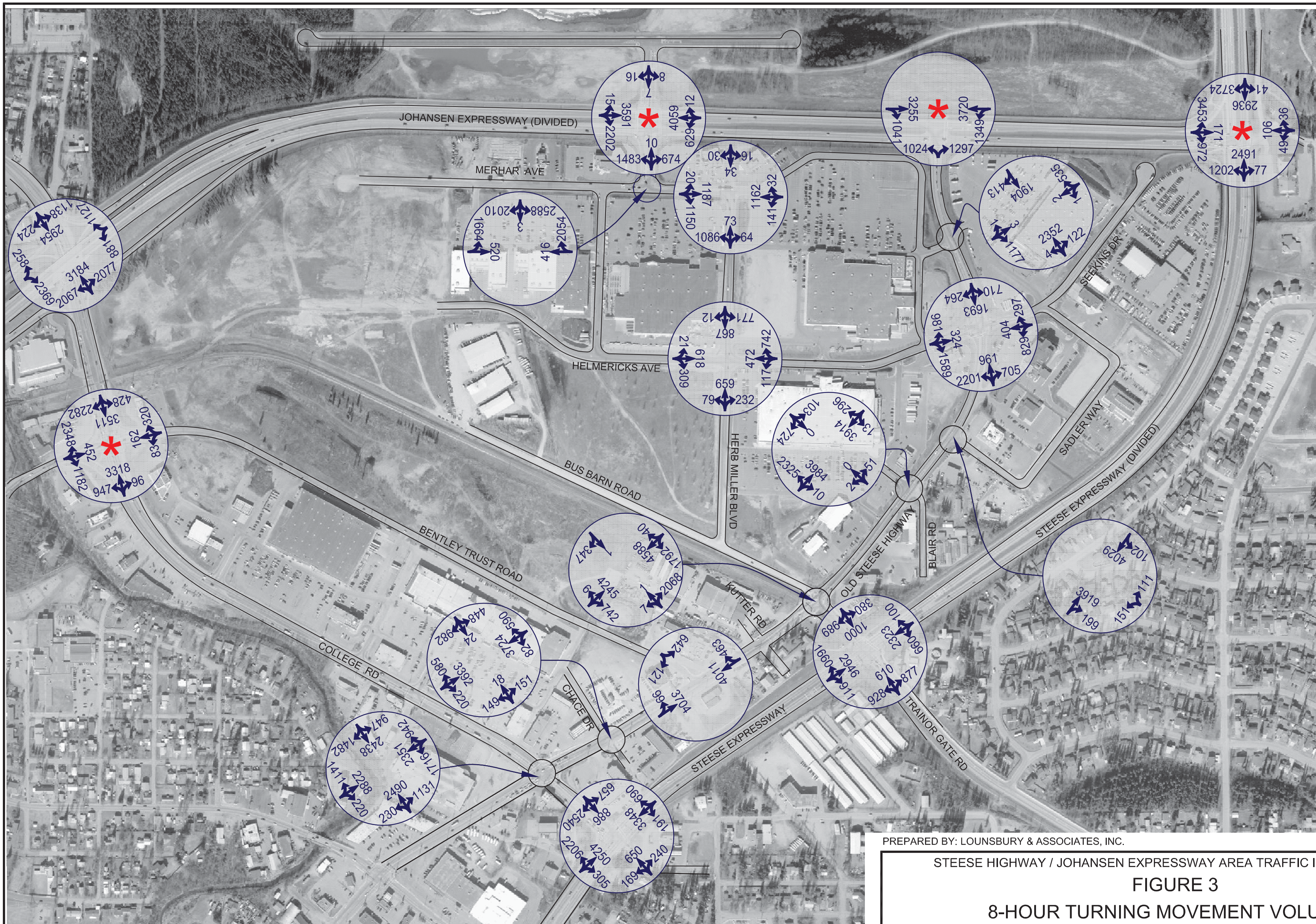
Continuous 8-hour turning movement and pedestrian crossing counts were performed at 14 of the study intersections. Additional intersection turning movement counts were provided by the DOT&PF for four of the study intersections. The DOT&PF provided counts were also performed for 8 hours, but only during certain morning, mid-day, and evening times. All counts were performed on weekdays. Based on the intersection count data, the greatest traffic demands on the road network generally occur during the p.m. peak hour. The peak hour for each intersection is shown in Table 2-3. Traffic counts used in this analysis are provided in Appendix B.

Table 2-3 Intersection Peak Hours

INTERSECTION	DATE/TIME COUNTED	PEAK HOUR
CONTINUOUS 8-HOUR COUNTS		
Hunter & Merhar	09/23/08 1200-2000	1630-1730
Merhar & Herb Miller	09/25/08 1200-2000	1615-1715
Merhar & Old Steese	09/25/08 1200-2000	1700-1800
Helmericks & Herb Miller	09/24/08 1200-2000	1645-1745
Old Steese & Sadler Way	09/23/08 1200-2000	1630-1730
Old Steese & Blair	09/23/08 1200-2000	1645-1745
Old Steese & Trainor Gate	09/23/08 1200-2000	1645-1745
Old Steese & Bentley Trust	10/08/08 1200-2000	1700-1800
Old Steese & Chace	09/24/08 1200-2000	1645-1745
Old Steese & College	09/23/08 1200-2000	1630-1730
Steese Expressway & College	09/24/08 1200-2000	1700-1800
Steese Expressway & Trainor Gate	09/25/08 1200-2000	1700-1800
Johansen & College	09/24/08 1200-2000	1700-1800
Old Steese & Helmericks/Seekins	09/23/08 1200-2000	1700-1800
DOT&PF PROVIDED COUNTS		
College & Illinois	07/18/07 0700-1000/1100-1300/1500-1800	1700-1800
Johansen & Hunter	07/12/07 0700-1000/1100-1300/1500-1800	1700-1800
Johansen & Old Steese*	07/18/07 0700-1000/1100-1300/1500-1800	1700-1800
Johansen & Steese Expressway	07/18/07 0700-1000/1100-1300/1500-1800	1700-1800

*In winter of 2008 this intersection was modified to include a 4th leg to the north.

Intersection turning movement volumes for the entire eight hour period and the peak hour of the intersection are presented in Figure 3 and Figure 4 respectively. Non-permitted and/or illegal movements were observed at several study intersections during the eight hour counting period and are included in Figures 3 and 4. These movements consisted of vehicles traversing raised medians and ignoring regulatory marking and signing. Pedestrian volumes observed during the continuous 8-hour counts are presented in Figure 5.



* COUNTS PROVIDED BY ADOT&PF

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FIGURE 3

8-HOUR TURNING MOVEMENT VOLUMES

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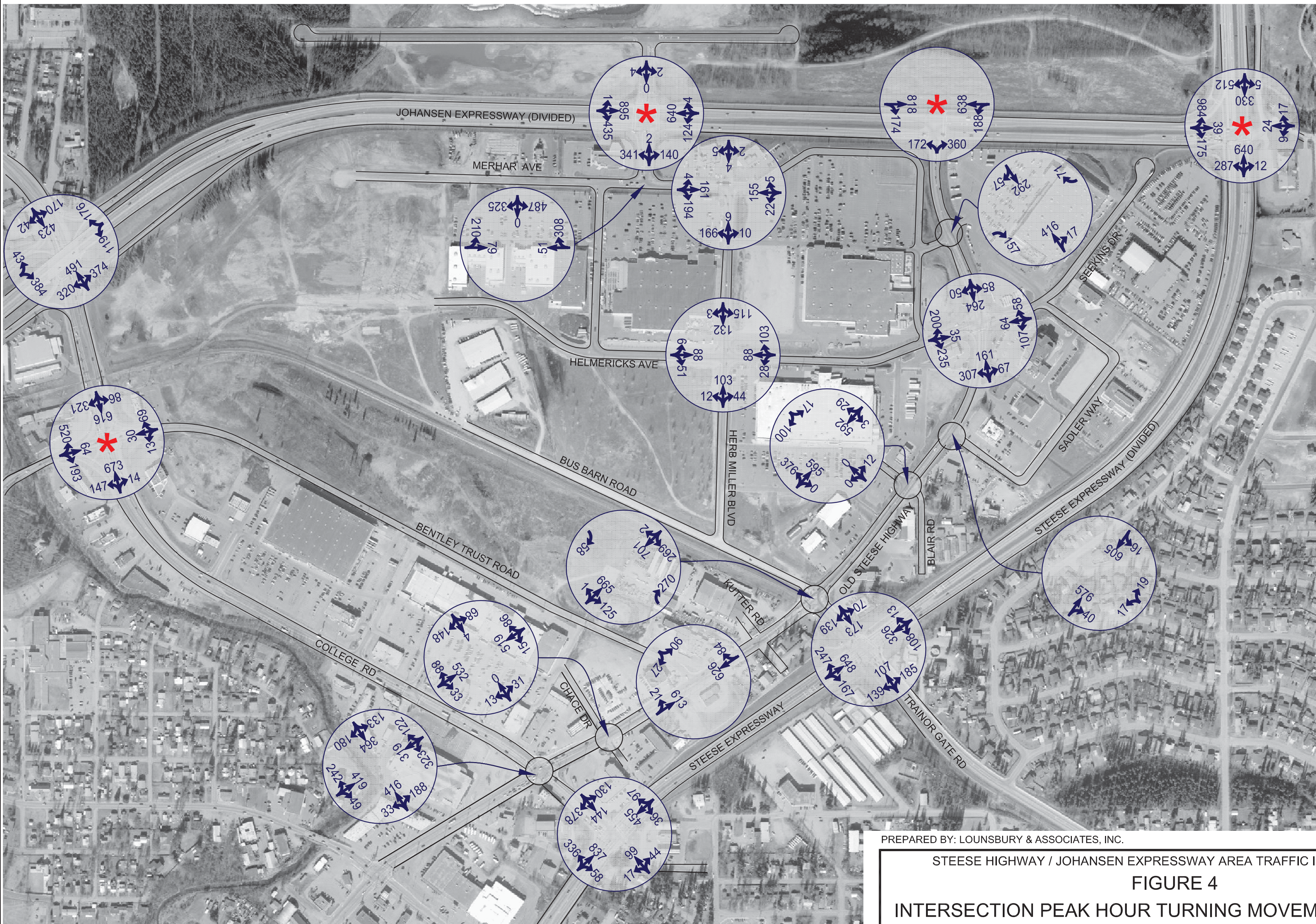

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FIGURE 4

INTERSECTION PEAK HOUR TURNING MOVEMENT VOLUMES

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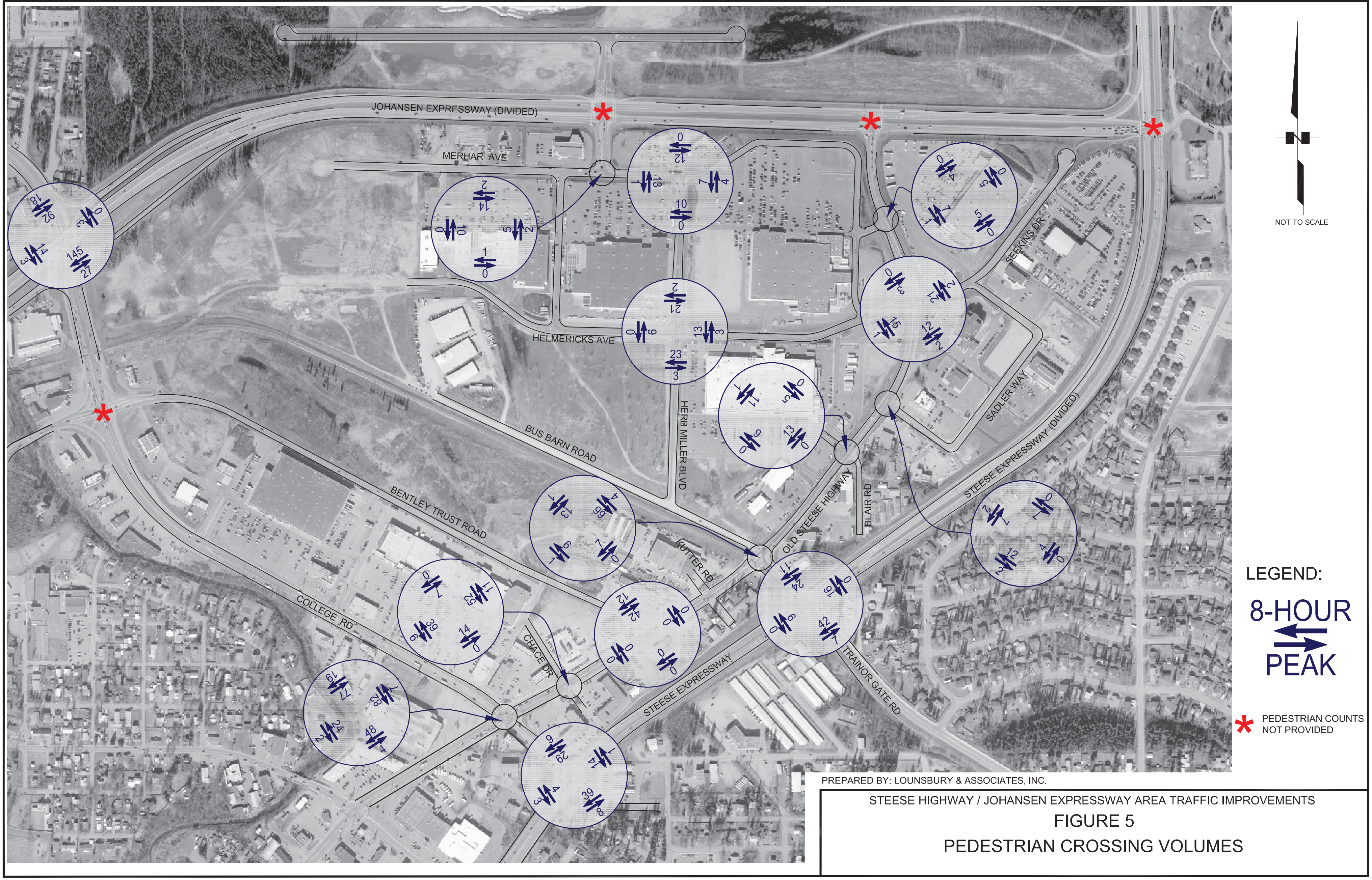

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FIGURE 5

PEDESTRIAN CROSSING VOLUMES

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2.5 2008 Existing Level-of-Service

A level-of-service (LOS) analysis was performed for the previously identified intersections and roadway segments using the 2008 traffic counts. The analysis utilized Synchro SimTraffic version 7 software by Trafficware and the Highway Capacity Manual. The following tables summarize the results of this analysis. Figures 6 and 7 present a graphical presentation of the LOS analysis. Appendix C contains the LOS worksheets. In general, left turning movements are the predominant movement leading to reduced LOS at studied intersections.

Table 2-4 2008 Signalized Intersection HCM LOS

Intersection	Delay (sec/veh)	V/C Ratio	LOS
Johansen – College	22.5	0.72	C
Johansen - Hunter	27.3	0.72	C
Johansen – Old Steese	30.6	0.66	C
Johansen – Steese Exp.	59.8	0.96	E
College – Bentley Trust Road	43.9	0.89	D
College – Old Steese	40.4	0.67	D
College – Steese Exp.	47.8	0.67	D
Old Steese – Helmericks Ave	31.3	0.66	C
Steese Exp. – Trainor Gate	23.8	0.61	C

Table 2-5 2008 Un-Signalized Intersection HCM LOS

Intersection	Delay (sec/veh)	V/C Ratio	LOS
Merhar - Hunter			
Movement 1 (WB)	72.2	0.98	F
Movement 2 (EB)	7282.9	8.54	F
Merhar – Herb Miller			
Movement 1 (WB)	1.0	0.02	A
Movement 2 (NB)	15.0	0.41	B
Merhar – Old Steese			
Movement 1 (EB)	12.1	0.25	B
Movement 2 (WB)	11.6	0.14	B
Helmericks Ave – Herb Miller			
Movement 1 (NB)	12.5	0.27	B
Movement 2 (SB)	16.6	0.48	C
Old Steese – Chace Dr			
Movement 1 (EB)	18.3	0.48	C
Movement 2 (WB)	13.0	0.11	B
Old Steese – Bentley Trust Road			
Movement 1 (EB)	19.4	0.37	C
Movement 2 (NBL)	0.3	0.03	A
Old Steese – Bus Barn Rd			
Configuration not supported			
by HCM analysis			
Old Steese – Blair Rd			
Movement 1 (EB)	37.6	0.57	E
Movement 2 (WB)	13.2	0.04	B
Old Steese – Sadler Way			
Movement 1 (WB)	14.7	0.10	B
Movement 2 (SBL)	0.2	0.02	A

Table 2-6 2008 Roadway Segment HCM LOS

Roadway	Running Time (sec)	Posted Speed (MPH)	Arterial Speed (MPH)	LOS
Bentley Trust Road				
College – Old Steese	76.5	30	19.6	C
College Road			13.5	D
Johansen Exp – Bentley Trust Rd	24.0	35	15.7	D
Bentley Trust Rd – Old Steese	21.8	35	16.7	D
Old Steese to Steese Exp.	55.6	35	11.3	E
Helmericks Avenue				
Old Steese – Herb Miller Blvd	39.8	30	21.4	C
Johansen Expressway			23.6	D
College Rd – Hunter St	11.5	55	10.4	F
Hunter St – Old Steese	25.9	55	17.4	E
Old Steese – Steese Exp.	27.3	55	27.2	C
Old Steese Highway			12.3	E
College Rd – Helmericks Ave	22.1	35	12.6	E
Helmericks Ave – Johansen Exp.	38.3	35	12.5	E
Steese Expressway			21.8	D
College Rd – Trainor Gate Rd	14.1	45	22.1	D
Trainor Gate Rd – Johansen Exp.	28.1	55	33.9	B

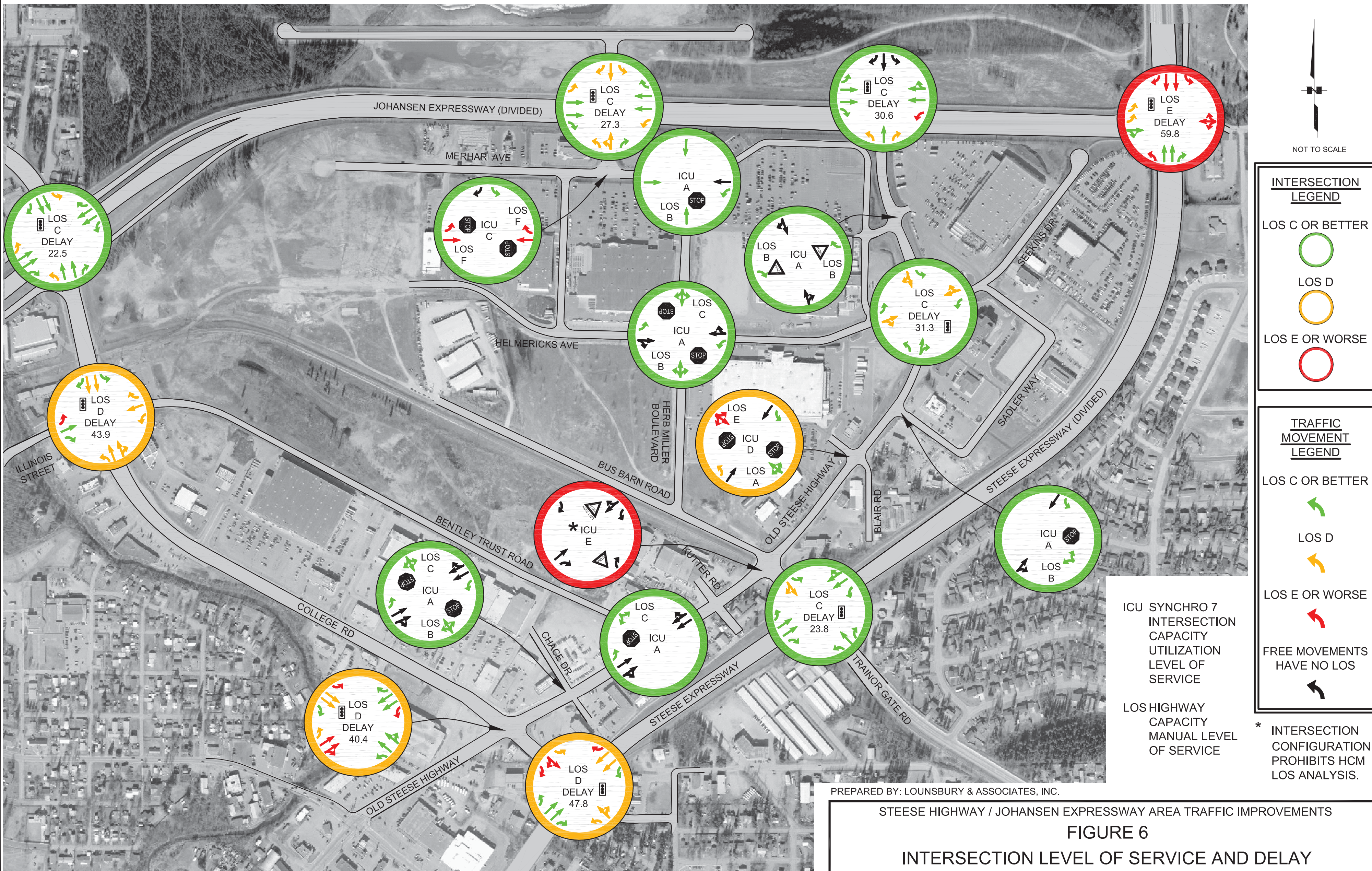

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FIGURE 6

INTERSECTION LEVEL OF SERVICE AND DELAY

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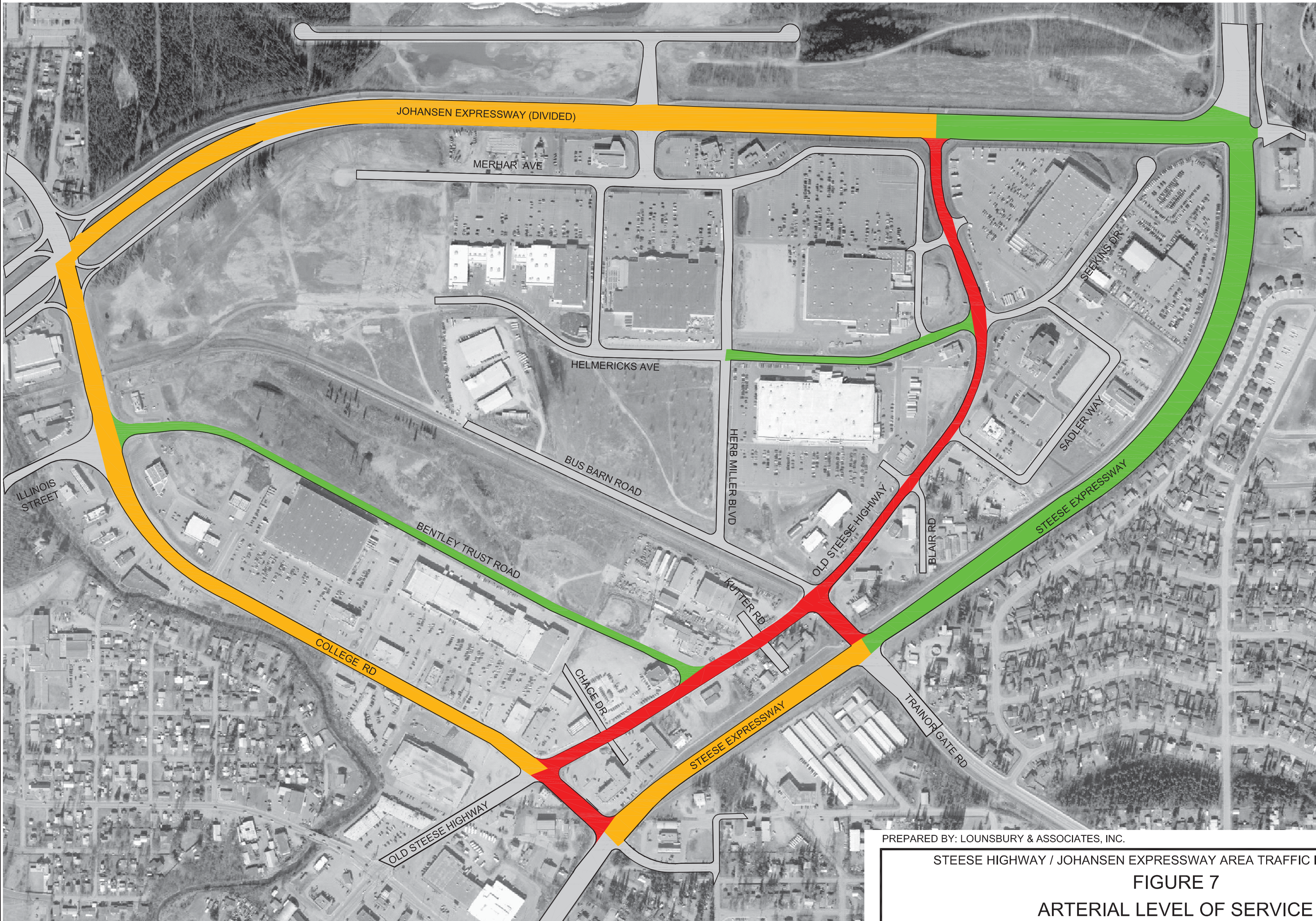

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FIGURE 7

ARTERIAL LEVEL OF SERVICE

MARCH 2009

2.5.1 Level-of-Service Methodology

Synchro SimTraffic version 7 was the main analytical tool utilized for this analysis. Synchro SimTraffic provides HCM compatible analysis for most cases. However, there are known discrepancies between the two programs, such as the allocation of the number of right-turn-on-red maneuvers. For this analysis, Synchro SimTraffic results were checked against HCM results at suspect locations.

Synchro SimTraffic also offers an additional analytical tool that the HCM does not support. Synchro SimTraffic calculates an Intersection Capacity Utilization (ICU) LOS for signalized and 2-way stop controlled intersections. The HCM does not provide a methodology for determining an intersection's overall LOS for 2-way stopped controlled intersections. The HCM only provides a LOS for movements that incur a delay, those that have to stop or yield to through movements. Individual turning movement delays between the two programs were found to be similar. The ICU LOS should not be confused with HCM LOS that is delay based. The ICU LOS is an indication of an intersection's overall reserve capacity. This study references use of the Intersection Capacity Utilization method with the prefix "ICU", all other references to LOS, delay and volume to capacity ratios (v/c) are based on the HCM.

Arterial LOS analysis was performed using Synchro 7 which incorporates the methods presented in chapter 15 of the HCM.

2.5.2 Existing Vehicle Classification

The percent trucks used in the analysis of existing conditions is 6% for all intersections and roadway segments. This value is based on data obtained from the Northern Region Annual Traffic Volume Report 2004-2006. The report contained vehicle classifications for a segment of Johansen Expressway in 2005 and for College Road in 2006.

2.5.3 Review and Comparison of Recent Traffic Impact Analysis

A review of previously completed TIAs for local development projects was compared to the results of this study. The years of analysis of the TIAs did not correspond directly to the year of analysis of this study for existing conditions, 2008. Based on known conditions at the time of this study versus assumptions made in the TIAs, no significant discrepancy was identified.

2.5.4 Intersection Specific Analysis

The following sections provide a detailed analysis of each intersection's individual approaches and movements.

- ***Johansen Expressway & College Road Intersection***

The Johansen Expressway is considered as the north-south roadway within the signal control unit, for continuity the same relationship is applied in this analysis. This fully actuated signalized intersection operates at a LOS C with a delay of 22.5 seconds. Eastbound and westbound lefts are operating at a LOS D.

The intersection is a signalized single point urban interchange. Johansen north-south through movements are contained on an over-pass while College Road through movements (east-west bound) are signal controlled. North and south bound through and left turns are signalized while the north and south right turns are yield controlled.

This intersection has the highest pedestrian traffic of studied intersections. The majority of pedestrian traffic is College Road crossings.

- ***Johansen Expressway & Hunter Street Intersection***

This fully actuated signalized intersection operates at a LOS C with 27.3 seconds of delay. Northbound and westbound left movements are functioning at LOS D.

Figure 8. Northbound Queues at Johansen Expressway and Hunter Street

This is a split phased intersection with the north and south movements being the split phases. The split phase operation is the result of intersection geometry, with northbound left turns conflicting with southbound left turns. Currently there is very little southbound traffic at the intersection. Additionally, the intersection of Merhar Avenue and Hunter Street is located just 240 feet south, influencing the northbound movements at this intersection.

- ***Johansen Expressway & Old Steese Highway Intersection***

This fully actuated signalized intersection operates at LOS C with a delay of 30.6 seconds. Northbound left movements function at LOS D with westbound lefts operating at LOS F.

At the time of observed traffic counts the north leg of this intersection had not been constructed, since then the north leg has been constructed and is being utilized by construction vehicles to further develop the area. Due to this recent development, the southbound approach of this intersection has been added for analysis. The southbound movements have very minimal traffic at this time during the peak hour. The intersection has been modeled with protected lefts on north-south legs of the intersection and protected-permitted on the east-west legs. Given the geometry of this intersection, it was also modeled as a split phase operation for the north and southbound movements.

- ***Johansen Expressway & Steese Expressway Intersection***

This actuated coordinated signalized intersection operates at LOS E with a delay of 59.8 seconds. Eastbound lefts function at LOS D and northbound lefts operate at LOS F. Southbound through movements are operating at LOS F.

This intersection has the highest traffic volumes of studied locations. The highest observed peak hour movement is the eastbound left turn at 984 vehicles per hour. This movement is conveyed through dual left turn lanes requiring its own phase. Intersection geometry and traffic flow imbalance contribute to this intersections reduced functional operation.

- ***College Road & Bentley Trust Road Intersection***

This intersection is signalized with fully actuated control operating at a LOS D with a delay of 43.9 seconds. College Road is considered as the east-west roadway within the signal control unit, for continuity the same relationship is applied in this analysis. Westbound left turns operate at a LOS E. During the peak hour, the westbound movement is over 500 vehicles, conveyed through a single turn lane. Northbound, southbound and eastbound right turns have a large channelized right turn lane. Eastbound rights have a dedicated right turn lane.

- ***College Road & Old Steese Highway Intersection***

This actuated coordinated signalized intersection functions at LOS D with a delay of 40.4 seconds. Eastbound lefts, southbound lefts and northbound through movements operate at LOS E. During the peak hour, southbound left turning volume exceeds southbound through volume.

This intersection is the master signal for coordination functioning with the signals on the Steese Expressway.

- ***College Road & Steese Expressway Intersection***

This actuated coordinated signalized intersection functions at LOS D with a delay of 47.8 seconds. Eastbound rights are operating at LOS F and southbound rights operate at LOS E.

Figure 9. Eastbound Right Queues at College Road and Steese Expressway. Note the white car using the left turn lane to bypass the queued traffic.

- ***Old Steese Highway & Helmericks Avenue Intersection***

This fully actuated signalized intersection operates at LOS C with a delay of 31.3 seconds. The southbound through movement is at LOS D.

Figure 10. Southbound Queue at Old Steese and Helmericks

- ***Steese Expressway & Trainor Gate Road Intersection***

This signalized intersection is actuated coordinated and operates at LOS C with a delay of 23.8 seconds. Eastbound lefts are functioning at LOS C.

Figure 11. Eastbound Queues at Steese Expressway and Trainor Gate Road

- ***Merhar Avenue & Hunter Street Intersection***

This 2-way stop controlled intersection is controlled in the east and west directions with free southbound movements. The intersection operates at ICU (Intersection Capacity Utilization Level-of-Service) C. Eastbound lefts and through movements function at LOS F. Westbound throughs operate at LOS F with westbound rights at LOS A.

- ***Merhar Avenue & Herb Miller Boulevard Intersection***

This is a 2-way stop controlled intersection with north and south movements stop controlled. The intersection operates at an ICU A. Northbound and southbound movements function at an LOS B. The north leg of this intersection is the Chili's Driveway Access and the east leg of this intersection is Wal-Mart parking lot access.

- ***Merhar Avenue & Old Steese Highway Intersection***

This intersection is actually two stop controlled driveway accesses with Old Steese Highway movements operating free. The Wal-Mart parking lot is served by the west leg and Home Depot's parking lot is served by the east leg. This intersection functions at ICU A. Eastbound and westbound rights operate at LOS B.

There is a median on Old Steese Highway through this intersection preventing eastbound and westbound through and left movements, as well as southbound and northbound left movements.

- ***Helmericks Avenue & Herb Miller Boulevard Intersection***

This intersection is 2-way stop controlled with east and west movements operating free. The intersection operates at ICU A. Southbound movements function at LOS C while northbound movements are at LOS B.

There is an approximate grade of 4% sloping up to this intersection from the north and south. East and west movements do not experience any change in grade through this intersection.

- ***Old Steese Highway & Chace Drive Intersection***

This intersection is 2-way stop controlled with north-south movements operating free. The intersection functions at ICU A. Eastbound lefts function at LOS C while westbound lefts are at LOS B.

- ***Old Steese Highway & Bentley Trust Road Intersection***

This intersection is stop controlled with north-south movements operating free. The intersection is operating at ICU A. The eastbound approach operates at LOS C

- ***Old Steese Highway & Bus Barn Road Intersection / Trainor Gate Road***

This intersection is unsignalized with free movements in the north and south directions. Southbound lefts are permitted while northbound left-turn movements have been prohibited. Eastbound and westbound right turn movements are yield controlled. East and west bound through movements have also been prohibited. The west leg of this intersection is not paved.

This intersection operates at ICU E. Individual HCM movement LOS or delay can not be determined as the HCM does not support this type of intersection control.

- ***Old Steese Highway & Blair Road Intersection***

This intersection is 2-way stop controlled with north-south movements operating free. The intersection operates at ICU D. Westbound movements function at LOS B while eastbound lefts function at LOS E.

- ***Old Steese Highway & Sadler Way Intersection***

This intersection is stop controlled with north-south movements operating free. The intersection operates at ICU A. Westbound lefts operate at LOS B.

2.5.5 Arterial Level of Service Analysis

The following sections provide a detailed analysis of each roadway's segment LOS.

- ***Steese Expressway – College Road to Johansen Expressway***

The segment of Steese Expressway from College Road to Johansen Expressway functions at LOS D. From College Road to the Johansen Expressway this arterial runs 1.1 miles. The arterial running speed was 21.8 mph and the posted speed is 45 mph south of Trainor Gate Road and 55 mph north of Trainor Gate Road. This arterial is a four lane divided expressway with a median down the middle. The median is a raised grassed median between College Road and Trainor Gate, and a grassed swale between Trainor Gate Road and Johansen Expressway.

- ***Old Steese Highway – College Road to Johansen Expressway***

The segment of Old Steese Highway from College Road to Johansen Expressway functions at LOS E. From College Road to Johansen Expressway the Old Steese Highway runs 0.69 miles. The arterial running speed is 12.3 mph and the posted speed is 35 mph.

This arterial's number of lanes and medians varies over the length of this segment. Between College Road and Trainor Gate Road, the arterial is a five lane street with two lanes in each direction with a two-way left turn lane in the middle. Between Trainor Gate Road and Helmericks Avenue, the highway is a three lane road with one lane in each direction and a two-way left turn lane in the middle. Between Helmericks Avenue and Johansen Expressway, the arterial is a two lane road with a continuous median down the middle.

- ***College Road – Johansen Expressway to Steese Expressway***

The segment of College road from Johansen Expressway to Old Steese Highway functions at LOS D. Old Steese Highway to Steese Expressway, College Road is LOS E. From Johansen Expressway to Steese Expressway, College Road runs 1.02 miles. The arterial running speed is 13.5 mph and the posted speed is 35 mph. This road is a four lane arterial with two lanes in each direction with a raised median in the middle, except from Illinois to Sam's Club where this road is a five lane arterial with two lanes in each direction and a two-way left turn lane in the middle.

- ***Johansen Expressway – College Road to Steese Expressway***

The segment of Johansen Expressway from College Road to Old Steese Highway functions at LOS D. Old Steese Highway to Steese Expressway it functions at LOS C. The combined segments of Johansen Expressway run 1.19 miles. The arterial running speed is 23.6 mph and the posted speed is 55 mph. This arterial is a four lane divided expressway with a swale median down the middle.

- ***Hunter Street – Johansen Expressway to Merhar Avenue***

This street is approximately 240 feet long. An arterial analysis is not applicable.

- ***Merhar Avenue – Hunter Street to Herb Miller Boulevard***

Due to this roadway's segment length and intersection control, arterial analysis is not applicable.

- ***Helmericks Avenue – Herb Miller Boulevard to Old Steese Highway***

The segment of Helmericks Avenue from Herb Miller Boulevard to Old Steese Highway functions at LOS C. The arterial running speed is 21.4 mph and the posted speed is 30 mph. This segment of Helmericks Avenue runs 0.31 miles and is a three lane street with one lane in each direction and a two-way left turn lane in the middle.

- ***Sadler Way – Old Steese Highway to Helmericks Avenue***

Due to this roadway's geometry, intersection control and available traffic volume information, arterial analysis is not applicable.

- ***Bentley Trust Road – College Road to Old Steese Highway***

Bentley Trust Road functions at LOS C between College Road and Old Steese Highway. This private street is a two lane street and is 0.62 miles long.

2.6 Traffic Safety

Collision histories of the study intersections roadways were reviewed in an effort to identify potential safety issues. Collision data collected during the most recent five-year period (January 1, 2003 to December 31, 2007) was provided by DOT&PF. Based on available records, a total of 669 collisions were recorded during this five year period. Of these collisions, 584 (87%) were intersection related and 85 (13%) occurred in the road segments between intersections. A summary of collisions occurring in the project area is presented in Table 5-1 and shown in Figure 14. The collision data provided by DOT&PF is included in Appendix D.

Table 2-7 Summary of Collisions

Location	Total 2003-2007	Crash Rate	Predominant Type	
			Angle	Rear-end
Intersection				
Merhar & Old Steese	1	N/A	0	0
Helmericks & Herb Miller	5	N/A	4	0
Old Steese & Blair	2	N/A	0	0
Old Steese & Trainor Gate	46	1.60	14	27
Old Steese & Bentley Trust	30	1.42	22	5
Old Steese & College	76	1.47	35	30
Steese Expressway & College	102	1.76	39	48
Steese Expressway & Trainor Gate	58	1.43	24	26
Johansen & College (Not including Ramps)	44	1.33	4	27
Johansen & College Ramps	32	N/A	1	23
Old Steese & Helmericks/Seekins	15	0.49	5	7
College & Illinois	88	2.00	38	38
Johansen & Hunter	3	0.20	1	2
Johansen & Old Steese	17	0.69	5	7
Johansen & Steese Expressway	40	0.89	19	13
College Road & Crossover Way*	24	N/A	14	7
Segment				
College: Old Steese to Illinois/Bentley Trust	36	2.17	24	8
College: Illinois/Bentley Trust to Johansen	6	1.07	3	0
Johansen: College to Hunter	9	0.34	2	1
Johansen: Old Steese to Steese Expressway	4	0.45	1	2
Steese Expressway: Trainor Gate to Johansen	5	0.30	2	1
Old Steese: College to Bentley Trust	6	1.69	4	1
Old Steese: Bentley Trust to Trainor Gate	2	0.68	0	2
Old Steese: Trainor Gate to Helmericks	1	0.16	0	0
Helmericks: Herb Miller to Old Steese	2	N/A	1	1
Bentley Trust: Old Steese to College	2	N/A	1	0
Uncoded	12	N/A	3	3

*This intersection is not included in the scope of this study but was noted in collision records.

More collisions occurred in January and February than any other month, and icy, snowy road conditions were factors in approximately 58% (386) of the collisions. An evaluation of the collisions occurring throughout the day showed that a large number of collisions occur at the hours of 1300-1400 and 1500-1600. Twenty collisions involved alcohol and/or drugs.

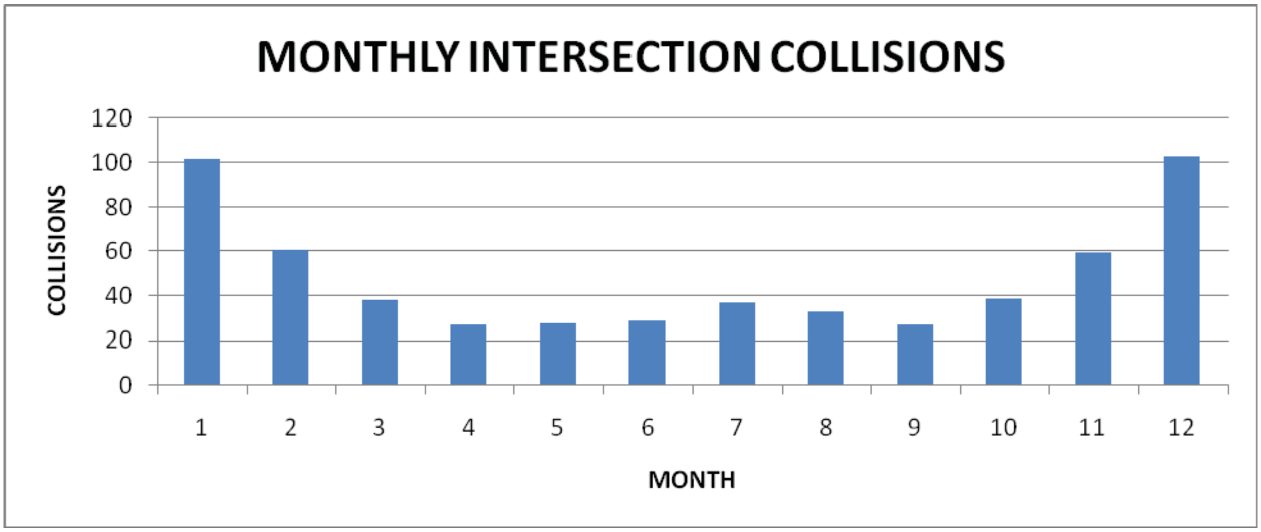

Figure 12. 2003-2007 Monthly Intersection Collision Distribution

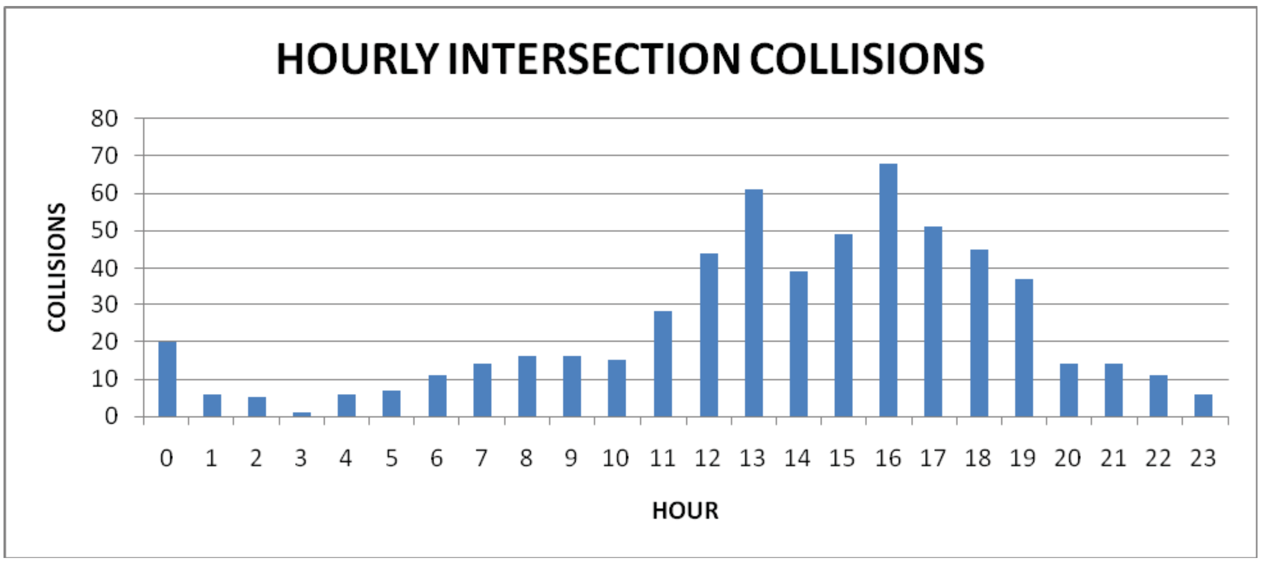

Figure 13. 2003-2007 Hourly Intersection Collision Distribution

1. ACCIDENT RATE BASED UPON AVAILABLE AADT.

2. COLLISION DATA NOT AVAILABLE FOR ALL STUDY INTERSECTIONS AND SEGMENTS.

3. ACCIDENT RATE BASED ON 2009 HSIP FORMULAS AND FACTORS. (PAGE A-2)

* INTERSECTION MODIFIED DURING ANALYSIS PERIOD.

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FIGURE 14

2003 - 2007 COLLISION HISTORY

3.0 FUTURE TRAFFIC CONDITIONS

As part of the Steese Expressway Traffic Analysis, future growth rates and traffic volumes were determined for roadways and intersections within the project area. Traffic projections have been prepared for 2020 and 2030. Table 3-1 on the following page lists those roadways along with recommended growth rates and projected average annual daily traffic (AADT). Figures 12, 13 and 14 show projected AADTs and peak hour turning movement volumes.

The proposed Steese Expressway traffic projections encompass the developing commercial Bentley Trust area along with areas north and east of the Steese Expressway and Johansen Expressway. Several important roads convey traffic through the center of this region and have been included for analysis. Road segments are based on Northern Region DOT&PF CDS Route Logs.

This section documents the methodologies, findings, and conclusions used to complete the traffic projection analysis. Traffic projections are the first step in fulfilling AASHTO recommendations that:

- The design of a highway and its features should be based upon explicit consideration of the traffic volumes and characteristics to be served, and

- Geometric design of new highways or improvements to existing highways should not usually be based on current traffic volumes alone, but should consider future traffic volumes expected to use the facility. A highway should be designed to accommodate the traffic volume that is likely to occur within the design life of the facility.

Construction of area improvements is anticipated to begin in 2010. Based on a 20-year design life, traffic projections have been completed for 2020 (mid year), and 2030 (design year). The majority of growth was developed by anticipating complete development of the Bentley Trust area by 2020. Growth rates after 2020 are less influenced by local development and more by the growth of traffic passing through this area. The primary methods employed in this study were analyzing existing conditions in the study area and assessing the anticipated changes through the year 2030.

Table 3-1 Developed Annual Growth Rates and Projected AADT

Roadway	Pre 2020 Growth Rate (%)	2020 AADT	Post 2020 Growth Rate (%)	2030 AADT
Bentley Trust Road				
Bentley Trust East of College	12	8090	1.5	9390
Bentley Trust West of Old Steese	10	7950	1.5	9230
Illinois South of College	2	13160	1.5	15270
College Road				
West of Steese Exp	1.5	21960	1.5	25490
College @ Bentley PTR	1.5	17730	1.5	20580
West of Illinois	1.5	26360	1.5	30590
East of Margaret	1.5	14730	1.5	17090
Helmericks Avenue				
West of Herb Miller Blvd	12	8710	1.5	10110
West of Wal-Mart Entance	5	14220	1.5	16500
Herb Miller Boulevard	10	5600	1.5	6500
Hunter Street	10	18200	1.5	21120
Merhar Avenue				
West of Hunter Street	10	12600	1.5	14620
Between Hunter and Herb Miller Blvd	10	8800	1.5	10210
Johansen Expressway				
West of College Rd	3	31750	1	35070
East of College Rd	3	31230	1	34500
Between Hunter and Old Steese	3	23190	1	25620
West of Steese Exp	3	26180	1	28920
Old Steese Highway				
South of Johansen Exp	3	12840	1.5	14900
North of Fred Meyer’s Entrance	3	20130	1.5	23360
North of Trainor Gate	3	23590	1.5	27380
South of Trainor Gate	3	16660	1.5	19330
North of College Rd	2	14780	1.5	17150
South of College Rd	1.5	11600	1.5	13460
Steese Expressway				
Between 3rd Ave and College	1	28460	1	31440
Between College and Trainor Gate	1	18100	1	19990
Between Trainor Gate and Johansen Exp	1	13240	1	14630
Between Johansen Expy and Farmers Loop	1	24150	1	26680
Trainor Gate Road				
East of Steese Exp	5	10110	1.5	11730
Between Steese Expy and Old Steese Hwy	3	12650	1.5	14680

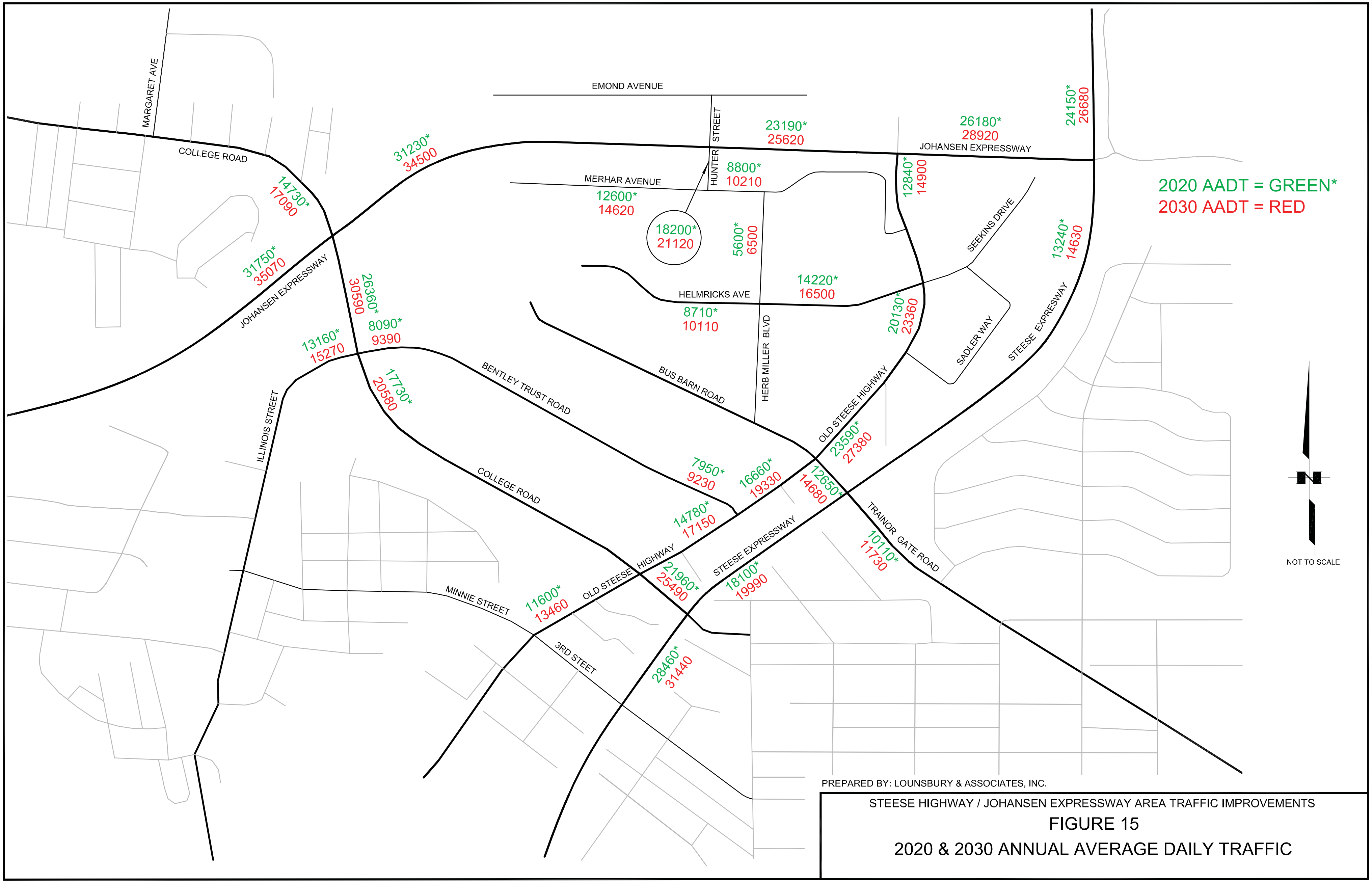

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FIGURE 15

2020 & 2030 ANNUAL AVERAGE DAILY TRAFFIC

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FIGURE 16

2020 PM PEAK FUTURE TURNING MOVEMENTS

MARCH 2009

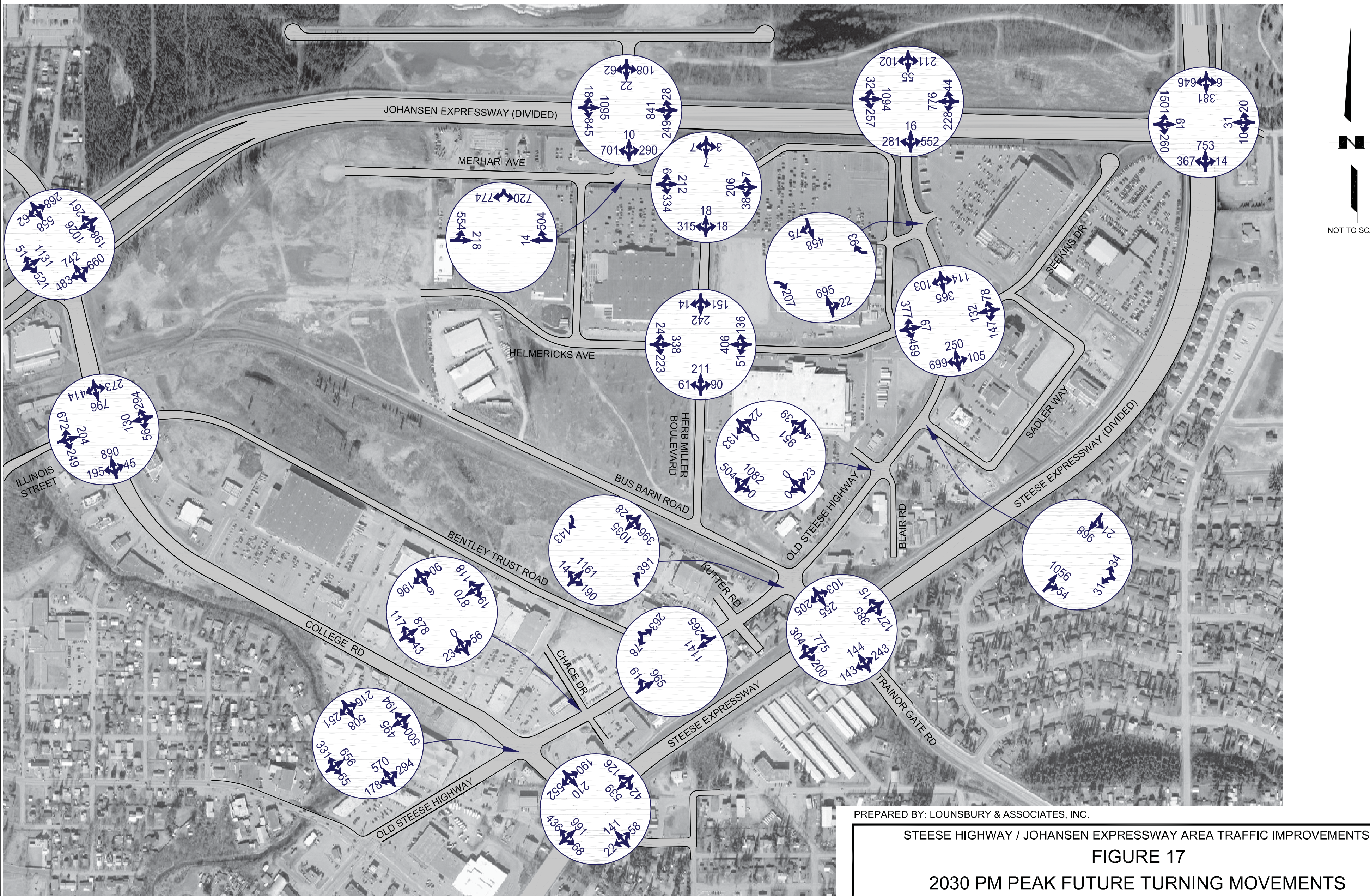

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FIGURE 17

2030 PM PEAK FUTURE TURNING MOVEMENTS

MARCH 2009

3.1 Traffic Demand

AASHTO states that traffic volumes indicate the need for improvements and directly affect the geometric design features, such as the number of lanes, widths, alignments, and grades. This section evaluates the traffic volumes anticipated to be on the roadways in future years.

The most basic measure of traffic demand on a roadway is the number of vehicles using the roadway on an average day. The volume of traffic on a roadway is defined as the average daily traffic (ADT) and/or the average annual daily traffic. Average daily traffic is defined by AASHTO as the total volume during a given time period (in whole days), greater than one day and less than one year, divided by the number of days in that time period. The AADT, according to the DOT&PF's Annual Traffic Volume Report, is the estimated number of vehicles traveling over a given road segment during one 24-hour day.

Traffic volume counts are recorded at various locations by either permanent traffic recorders (PTR) or tube counts. Recorded counts are published as AADTs for individual roadway segments by DOT&PF in the Annual Traffic Volume Report. This segment data provides a basis for determining historic growth and estimating future traffic demand.

3.1.1 Historical Data Analysis

- ***Historic Traffic Volumes***

The locations of available historic AADT counts recorded near the project area can be found in Appendix E1. Due to the count locations presented in the Annual Traffic Volume Report, the evaluated roadway segments may not directly correspond to project limits.

Historic AADT segment data was utilized to develop historic annual growth rates for individual road segments. In general, traffic appears to fluctuate, increasing some years and decreasing on others. Historic AADTs for project roadway segments are presented in Figure 15.

Growth rates for three time periods were developed – 2003 to 2008, 1998 to 2008, and 1988 to 2008. The three time periods provide short-term, mid-term, and long-term overviews of growth trends. Growth rates for each time period were developed for the segment by evaluating historical traffic growth and by performing a statistical regression analysis (called a linear trend line analysis) of the historical data. In both analyses, growth rates are determined from the following equation:

Where: $$AADT_{Future} = AADT_{Present} \cdot (1+i)^n$$

i = Growth Rate
n = number of compounding periods

Growth rate calculation worksheets and supporting data are included in Appendix E1.

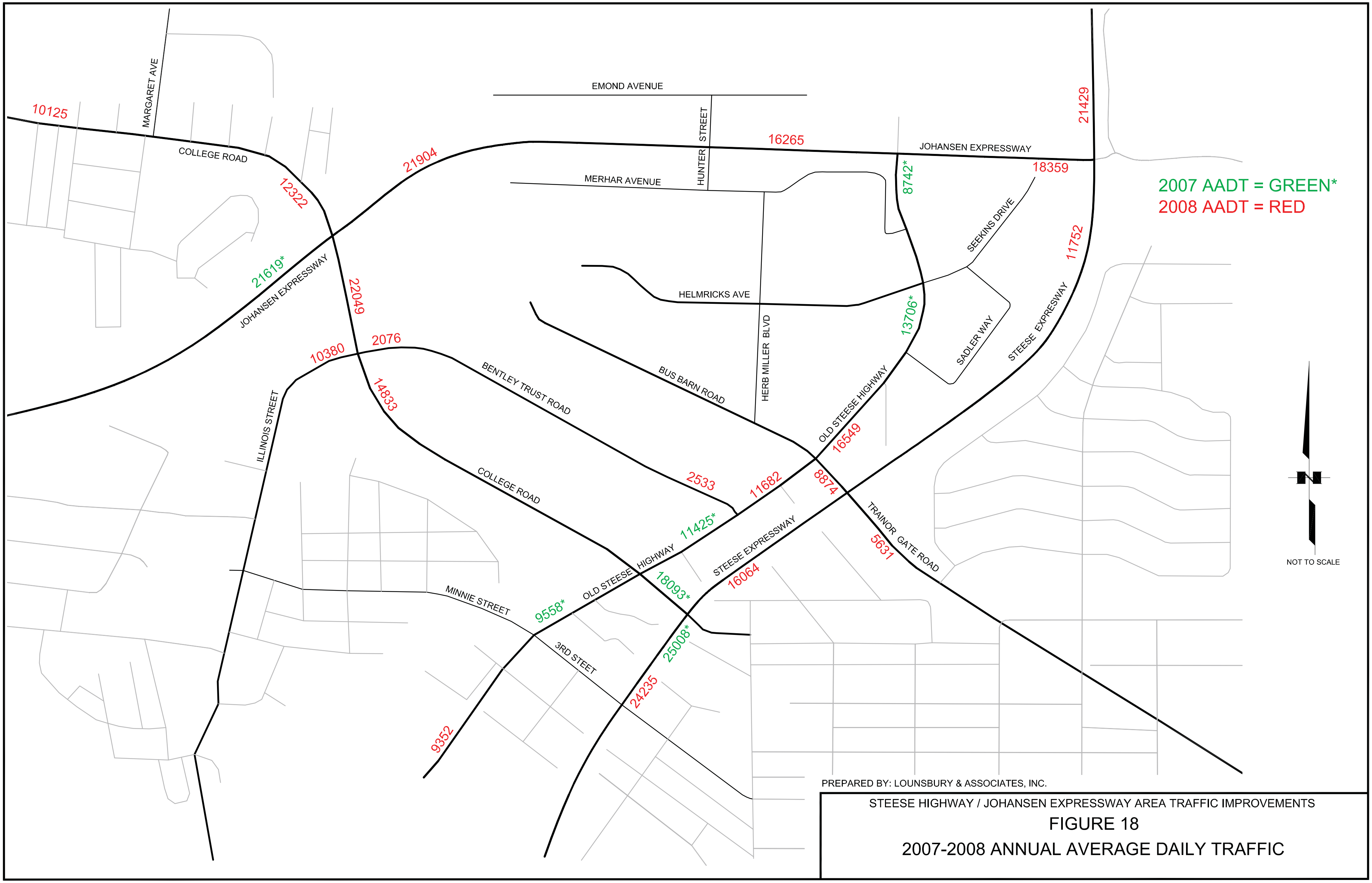

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FIGURE 18

2007-2008 ANNUAL AVERAGE DAILY TRAFFIC

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- ***Historic Growth Analysis***

The historical annual growth rate is developed by using the beginning year AADT and the ending year AADT of each time period for each segment. Annual growth rates determined from the beginning and ending years of each period do not account for fluctuations from one year to the next. In addition, growth rates may be skewed if the beginning or ending year happens to be significantly higher or lower than other years in the time period. Historic annual growth rates for each link are shown in Figure 16.

- ***Linear Trend Line Growth Analysis***

A linear trend line analysis of the available historic AADTs for each time period was also developed for each segment. This statistical analysis is based on linear regression, which develops a statistical model that represents the historical data. Compound annual growth rates can be calculated from linear trend line equations. Growth rates based on the linear trend line analysis are also presented in Figure 16.

The result of this analysis is a straight line that "best fits" the given set of data. A "*Standard Coefficient of Determination*", called R^2, has been defined to characterize how well the line matches the given data, or quantify the year-to-year variations in traffic volumes. Values of R^2 range from zero (0) to one (1). Values of R^2 near 1 indicate that the linear model explains all variability in the historic traffic volumes, or that all variations that have occurred can be considered expected or accepted fluctuations. Conversely, values of R^2 near 0 indicate a weak linear relationship among the data, or that the variations are more random in occurrence. As an example, an R^2 value of 0.7 may be interpreted as follows: Approximately seventy percent of the variation between the year-to-year traffic volumes can be considered as expected or normal. The remaining thirty percent can be explained by unknown circumstances or inherent variability. This unknown condition can range from unique social or economic conditions or such things as road construction that diverts traffic. For this study, values of R^2 above 0.5 are considered as acceptable or valid.

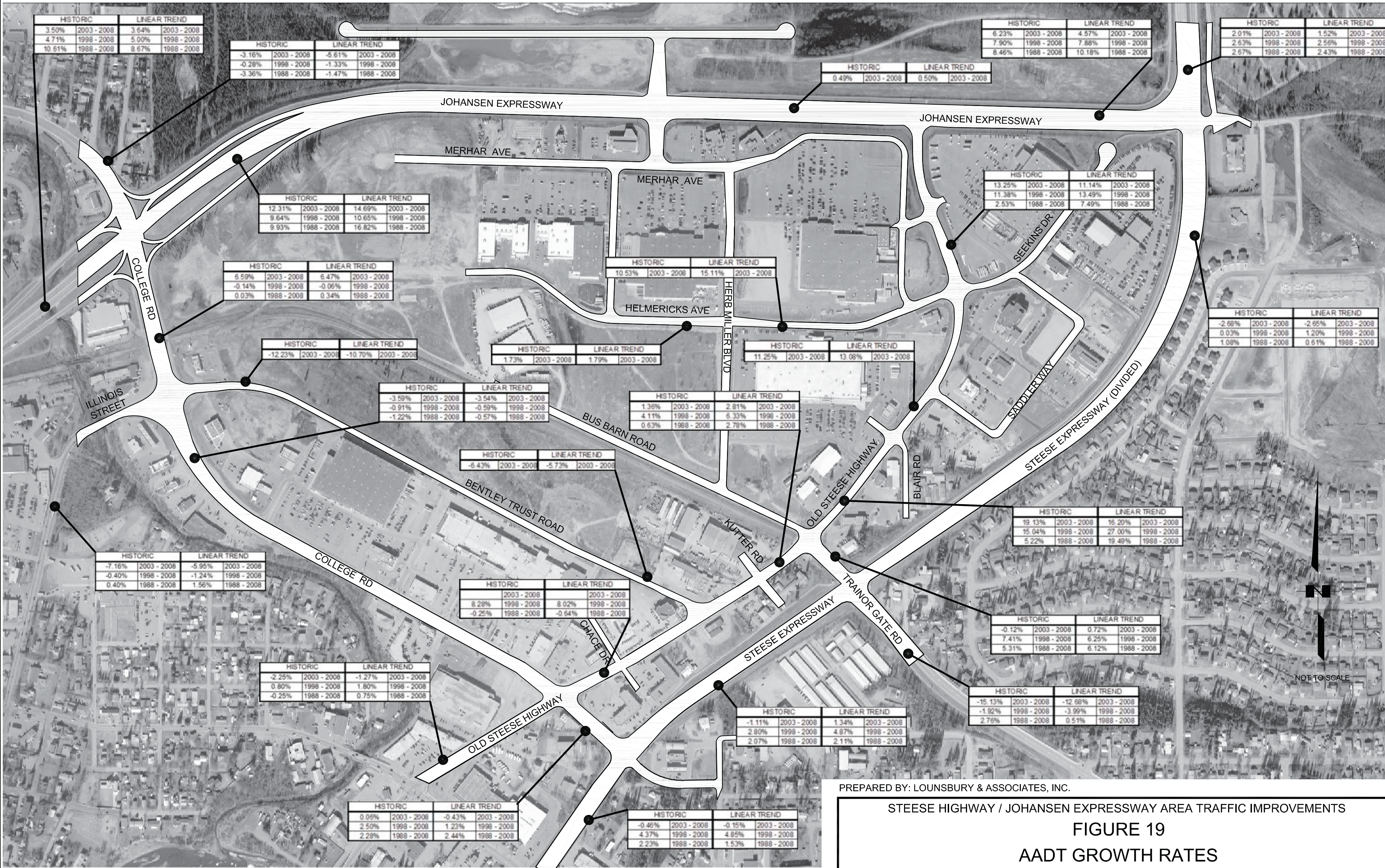

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FIGURE 19

AADT GROWTH RATES

MARCH 2009

- ***Historical Population Growth***

As the population of an area fluctuates, traffic volumes also fluctuate. Population growth rates provide a comparison to traffic volume growth rates and are used to verify the findings of the traffic volume growth rate determination. Population statistics are not always available to calculate population growth rates for the same time periods established in the AADT growth calculations. As such, population growth rates are determined for a range of time periods.

Growth rates calculated from United States Census historical data were compiled for the North Star Borough and the City of Fairbanks. A summary of historical population growth is presented in Table 3-2. The population data for 2008 is an estimate from the State of Alaska Department of Commerce, Community and Economic Development.

Table 3-2 Population Growth Rates

Fairbanks North Star Borough Historical Population		City of Fairbanks Historical Population	
Period	Annual Growth Rate	Period	Annual Growth Rate
1950-1960	8.38%	1950-1960	8.72%
1960-1970	0.55%	1960-1970	1.05%
1970-1980	1.64%	1970-1980	4.37%
1980-1990	3.71%	1980-1990	3.14%
1990-2000	0.64%	1990-2000	-0.20%
2000-2008	1.98%	2000-2008	0.57%

As seen in Table 3-2, all years show positive growth with the exception of the City of Fairbanks during the 1990 to 2000 period. Overall the general positive population growth supports the observed positive traffic volume growth.

- ***Future Population Growth***

The Alaska Department of Labor, Research & Analysis Section developed a publication entitled "Alaska Population Projections: 2007-2030." The Department of Labor forecast indicates the population for the North Star Borough will continue to increase through the year 2030. The report indicates that the population is anticipated to continue to grow within a range of 0.75% and 1.4% compound annual growth rate. Excerpts from the "Alaska Population Projections: 2007-2030" study are included in Appendix E2.

Table 3-3 Projected Population Growth Rates

Fairbanks North Star Borough Population Projections	
Period	Annual Growth Rate
2006-2010	1.40%
2010-2015	1.02%
2015-2020	0.86%
2020-2025	0.80%
2025-2030	0.75%

3.2 Traffic Growth Methodology

Traffic patterns on any roadway show considerable variation in traffic volumes on a seasonal basis, a daily basis and an hourly basis. Determining which volumes should be used for roadway design is important in ensuring the roadway provides sufficient capacity. AASHTO provides guidance in selecting daily and hourly volumes in establishing design criteria associated with those volumes. DOT&PF's traffic data collecting efforts provide the historic and current AADT to determine future volumes. Existing turning movement counts indicate the peak PM time period to be the daily peak hour.

It has been assumed that by the year 2020 the Bentley Trust area will be completely developed. Growth rates developed for years prior to 2020 take into consideration development of all significant vacant lands within the study area. The AADT given in Table 3-1 Developed Annual Growth Rates and Projected AADT was generated using historical 2007 and 2008 AADT and the developed growth rates. There was no historical data for Herb Miller Boulevard, Hunter Street and Merhar Avenue.

Growth in the area beyond the year 2020 will be attributed to development in areas outside the study area. Growth rates after 2020 are less influenced by local development and more by the growth of traffic passing through this area. Examination of historical AADT and population growths assisted in the development of growth rates from 2020 to 2030.

Based on these two assumptions, two methodologies were utilized to develop future traffic volumes. For the time period up to 2020, a trip generation method was used to develop trips for the Bentley Trust area along with a more generalized method based on past historic growth and anticipated population growth to determine pass through traffic. For the time period from 2020 to 2030, the generalized method was used.

3.3 Trip Generation

Five areas of vacant land associated with the Bentley Trust were determined to be possible future traffic generators. These areas are:

- Beyond the west end of Merhar Avenue and west end of Helmericks Avenue,
- South of Bus Barn Road and North of College Road,
- At the southeast corner of Helmericks Avenue and Herb Miller Boulevard intersection,
- At the northeast corner of Helmericks Avenue and Herb Miller Boulevard intersection, and
- Northside Business Park located north of Johansen Expressway connecting at Old Steese Highway.

For areas other than the Northside Business Park, the General Shopping Center (820) category of the ITE Trip Generation 7th Edition was used to calculate the number of trips generated. An average of 3.75 trips per 1000 square feet of leasable commercial area is given for this use.

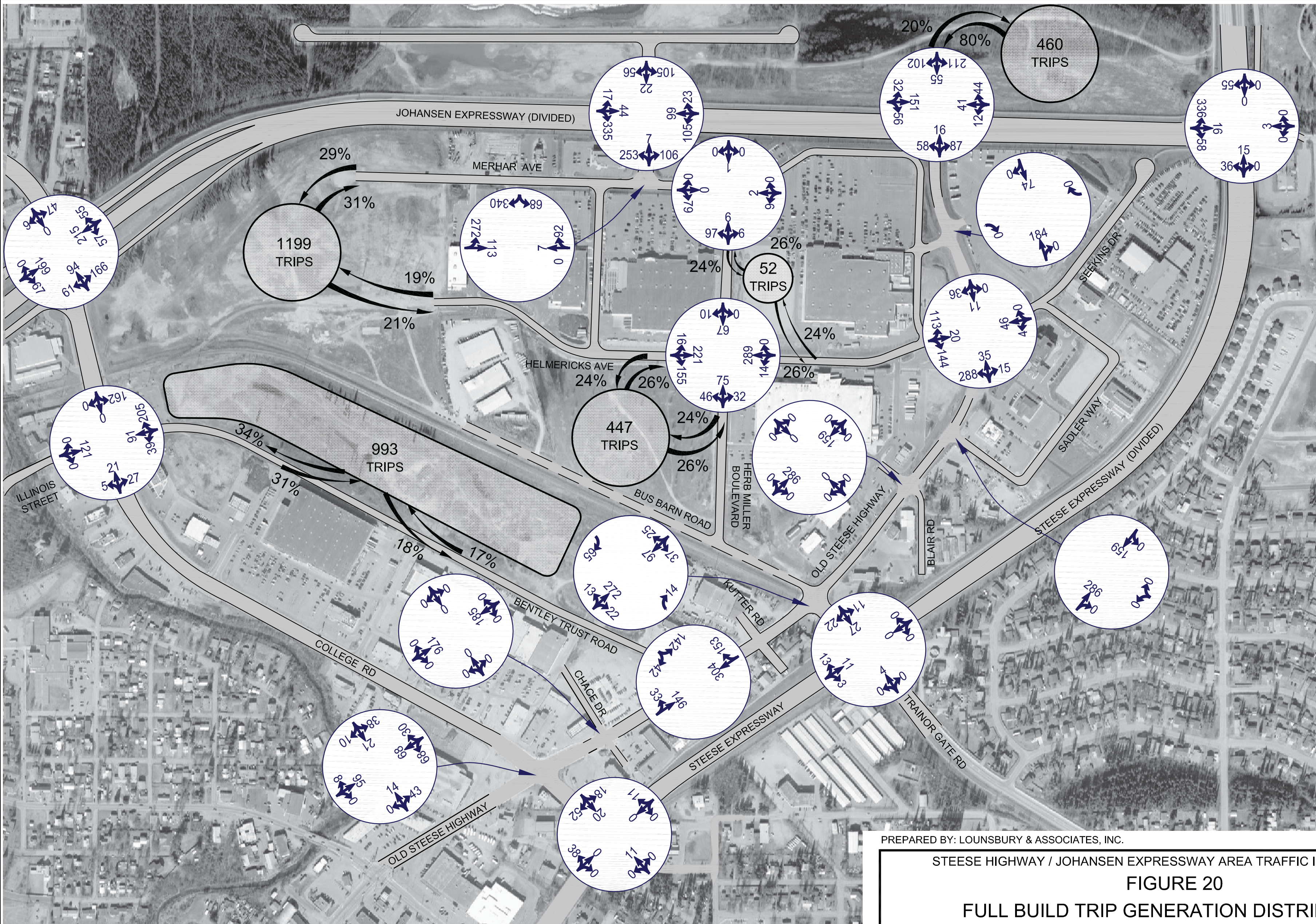
Within the region of existing commercial development between Johansen Expressway and the Steese Expressway north of College Road, aerial photography shows an average 22% for developed areas as leasable commercial area. Total trips generated for each of the assumed sources utilized this value to determine the gross leasable land for each area of vacant land. See Figure 17, Trip Generation Map, for trip distribution and total trips anticipated to be generated by each source under a complete build-out assumption. Based on this method, this area could potentially accommodate 717,760 square feet of leasable commercial area generating 2,691 trips.

Trips generated were distributed within the region for the PM peak hour using the ITE entering/exiting ratio for the PM peak and the existing percentage of overall traffic at access points. Additionally, intersection turning movements were based on existing turning movement percentages for each intersection leg. The trip generation does not account for traffic that does not have an origin or destination within the study area.

The Northside Business Park Traffic Analysis, 2007, prepared by Stutzmann Engineering Associates, inc. was used when adding trips generated by this future development. Trips were distributed as they are shown on Exhibit 17, 2 of 2 for the 2008 net change during peak hour. This Exhibit has been included in Appendix E3.

3.4 Growth Rate Determination

Trips that do not have an origin or destination within the study area are considered as pass-through traffic. The comparison of historical annual average growth rates to that of total development is an important deciding factor when estimating pass-through traffic. The pass-through traffic is expected to have growth as the surrounding area is developed and the population of Fairbanks increases.



TRIP DISTRIBUTION AT INTERSECTIONS IS BASED ON EXISTING COUNTS.

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FIGURE 20

FULL BUILD TRIP GENERATION DISTRIBUTION

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Future population growth is expected to continue with the expansion of resource development, industry, tourism, recreation, and settlement. Although population growth rates should not be used as a direct one-to-one comparison with traffic growth rates, they provide valuable input for assessing the characteristics of future transportation needs. It is believed that as the population centers outside of this project grow, so will the traffic on the roads linking them.

Annual population growth rates for the City of Fairbanks from 1990 to 2000 have shown a decline of -0.20%. In more recent years, from 2000 to 2008, population growth has increased at a rate of 0.57% in Fairbanks; the Borough has rates of 0.64% for 1990 to 2000 and 1.98% for 2000 to 2008.

Based on past historic traffic growth rates, anticipated development and a positive population growth, a pass-through annual growth rate of 1.0% through 2030 is recommended for the for higher volume roadways (Steese Expressway and Johansen Expressway). An annual growth rate of pass-through traffic on lower volume roads is recommended to be 1.5% through 2030 within the region.

3.5 Roadway Growth Rate Analysis

The following sections detail each study roadway's projected growth.

- ***Bentley Trust Road***

This road lies adjacent to approximately 27 acres of developable land. Traffic generated from adjacent development comprises the majority of the historic growth. Based on the *Trip Generation Method* of the developable land, a growth rate of 12% for the segment east of College Road and 10% for the segment west of the Old Steese Highway is recommended up to 2020. After 2020 a growth rate of 1.5% equal to the pass-through growth rate is recommended for all segments.

Roads with low traffic volumes such as Bentley Trust Road can experience periods of high growth until adjacent lands are developed. It has been assumed that by the year 2020 all significant vacant land will have been developed. After 2020 growth is associated with background growth in the surrounding area.

- ***College Road***

College Road's historical growth shows a decline in traffic for short mid and long term periods. This road is adjacent to older commercial property and it is likely that stores along this corridor are being over looked for newer stores near Helmericks Avenue. However, this region could undergo redevelopment to remain economically viable.

The City of Fairbank's population growth indicates a trend of positive growth for the area and demands for developable land will likely drive redevelopment as vacant land is filled. It is reasonable to assume that College Road could see a growth rate equal to that of the developed pass-through growth rate.

A growth rate of 1.5% is recommended for all segments to 2030. This road does not have adjacent developable land. Roads that are not adjacent to future development are not as greatly influenced by the *Trip Generation Method*.

- ***Helmericks Avenue***

This road lies adjacent to approximately 46.5 acres of developable land. Traffic generated from adjacent development comprises the majority of the historic growth. A growth rate of 12% west of Herb Miller Boulevard and 5% east of Herb Miller Boulevard is recommended up to 2020 based on the *Trip Generation Method*. After 2020 a growth rate of 1.5% equal to the pass-through growth rate is recommended for all segments.

- ***Herb Miller Boulevard***

This road is adjacent to approximately 12.4 acres of developable land. There was no historical AADT data available for this road. However, all traffic growth can be attributed to the continuing development of the area. A growth rate of 10% is recommended up to 2020. After 2020 a growth rate of 1.5% equal to the pass-through growth rate is recommended for all segments. Traffic on this road is expected to grow at nearly the same rate as Helmericks Avenue.

- ***Hunter Street***

There was no historical AADT data available for this road. Similar to other adjacent roadways, a growth rate of 10% is recommended up to 2020. After 2020 a growth rate of 1.5% equal to the pass-through growth rate is recommended for all segments. This road is heavily influenced by growth on its connecting streets.

- ***Merhar Avenue***

This road is adjacent to approximately 33 acres of developable land. There was no historical AADT data available for this road. A growth rate of 10% is recommended up to 2020. After 2020 a growth rate of 1.5% equal to the pass-through growth rate is recommended for all links. Traffic on this road is expected to grow at nearly the same rate as the previous discussed roadways.

- ***Johansen Expressway***

The Johansen Expressway serves as a major thoroughfare for traffic moving east and west along the City of Fairbanks and provides one of the more prominent links to developable lands, both north and south of the expressway.

To accommodate anticipated adjacent development, a growth rate of 3% for all segments is recommended for the Johansen Expressway up to 2020. After 2020, a growth rate of 1.0% equal to the pass-through growth rate is recommended for all segments.

Historic data for the Johansen Expressway shows rapid growth within the last 5, 10, and 20 years. This can be attributed to the development of the Bentley Trust area. Of interest is the segment between Hunter and the Old Steese. Due to the location of access points to the Bentley Trust development area, this section of the Johansen Expressway experiences a lower volume than the adjacent sections and also has a lower historic growth rate.

As the surrounding vacant land develops, it is assumed that the Johansen Expressway's growth patterns will resemble what is currently observed today. As the area fully develops, growth will decline to that of a more pass through rate.

- ***Old Steese Highway***

The Old Steese Highway has many driveways and side roads that serve businesses along its length. While the Old Steese Highway does not have adjacent developable land, it serves as a collector to adjacent streets that do. The Old Steese connection to Johansen Expressway and proximity to the Steese Expressway position it as primary route for reaching developing businesses.

Historic volume data shows a distinct change in traffic patterns along the Old Steese Highway in the vicinity of Trainor Gate Road. North of Trainor Gate Road, the Old Steese Highway has experienced a high growth, attributed to the development of the Bentley Trust area. South of Trainor Gate Road, growth has been flat to moderate. It is assumed that the Old Steese Highway's growth patterns will resemble what is currently observed today as the Bentley Trust area continues to develop.

Trip generation from development along Bentley Trust Road influences the southern portions of the Old Steese Highway. Traffic from developable lands near Helmricks Avenue feed into the Old Steese Highway along the northern section. From 2008 to 2020 a growth rate of 1.5% south of College Road is recommended. From College Road to Trainor Gate Road an annual growth rate of 2.0% is recommended. On segments from north of Fred Meyer's entrance to the Johansen Expressway a growth rate of 3% is recommended. After 2020 a growth rate of 1.5% equal to the pass-through growth rate is recommended for all segments. Pass-through traffic for the Old Steese Highway is assumed to correlate to that of the connected local roads.

- ***Steese Expressway***

Historical growth within the last 20 years for all segments of the Steese Expressway varies between 1.08% and 2.67%. A majority of segments show a decline in traffic over the last 5 years south of the Johansen Expressway.

The Steese Expressway is not adjacent to future development and has not been greatly influenced by the past development of the Bentley Trust land. It is assumed that the Steese Expressway's growth patterns will resemble what is currently observed today, that of a more pass through rate of growth. As such, a growth rate of 1.0% is recommended for all segments to 2030. This road does not have adjacent developable land and serves as a principal arterial between residential and commercial developments.

- ***Trainor Gate Road***

Historic annual growth rates for Trainor Gate Road show negative growth in the last 5 and 10 year periods east of the Steese Expressway, -15.13% and -1.92% respectively. These negative values can be misleading to the actual growth of Trainor Gate Road. During 2003, the recorded AADT tripled over previous and following years causing a spike in the data. Because the historic annual growth is calculated from the beginning and ending years the AADT of 2003 has a dramatic effect on the values calculated for the last 5 years.

Linear trend lines for these time periods are also skewed by this spike. The R^2 values for linear trend lines of this segment in the last 5 and 10 year periods are 0.25 and 0.1 respectively and show a low correlation between the data and the trend line.

Examining the years between 1988 and 2002 prior to the spike in 2003 shows an annual average growth of 2.79%. After 2003, between the years 2004 to 2008 east of the Steese Expressway, Trainor Gate Road shows an annual average growth of 6.63%. It is assumed that positive growth rates along Trainor Gate Road will continue until the vacant land to the north is fully developed.

Between Old Steese Highway and Steese Expressway a growth rate of 3% up to year 2020 is recommended. East of Steese Expressway a growth rate of 5% is recommended. After 2020 a growth rate of 1.5% equal to the pass-through growth rate is recommended for all links.

- ***Minor Side Streets***

Minor side streets included in this study are all along the Old Steese Highway. The side streets included are Chace Drive, Blair Drive, Sadler Way and the Wal-Mart/Lowe's driveways. Historic information for these side streets is not available. However, the 2008 8-hour traffic counts show relatively low volumes compared to the major street volumes.

All side streets provide access to fully developed land with the exception of Sadler Way, where there are still small parcels available for development. Redevelopment or change in existing land use is not anticipated to occur during the time frame of this study. However, a conservative approach was used in forecasting future traffic volumes for these side streets. An annual growth rate of 5% was applied to these locations.

3.6 Future Turning Movements

Future turning movement volumes for 2020 and 2030 were determined based on the existing PM peak hour turning movements. The existing peak hour turning movement counts were normalized using DOT&PF seasonal adjustment factors to reflect an annual average daily number. These adjusted values were then grown by the appropriate pass-through growth rate for the associated target year. Finally, turning movement trips from the *Trip Generation Method* were added.

3.7 Design Hourly Volume

A Design Hourly Volume of 10.5% has been recommended based on the closest PTR. The DHV is that part of the AADT that can be expected to be on the roadway during the hour of highest volume (peak hour) of any given day. AASHTO has determined that the DHV for roadways is the volume of traffic that is best represented by the 30th highest hour volume of any given year.

Hourly traffic counts have been performed by DOT&PF at one Permanent Traffic Recorder (PTR) station relevant to this project since 1960. This count was taken over a continuous 24-hour period and provides the best available information to determine the 30th highest hour. The PTR is located on College Road near the Bentley Mall and is the closest PTR to this site.

Analysis of the PTR data on College Road revealed that the DHV corresponding to the 30th highest hour volume was 10.5% of the average annual daily traffic. This occurred on the Fourth of August, during the Tanana Valley State Fair which is also located along College Road. The 30th highest hour volume for this site falls within the range AASHTO recommends.

3.8 Peak Hour Factor

The PHF is the ratio of the total peak hour volume to the peak rate of flow within that hour. It is a measure of traffic demand fluctuation within the peak hour. Peak hour factors are never greater than one (1) or less than zero (0). AASHTO recommends that peak hour factors normally fall within the range of 0.75 to 0.95 for highways. The PHF for each intersection was determined from observed counts. See Appendix B for the observed PHF.

3.9 Composition of Traffic

A value of 6% is recommended for percent trucks. Vehicles of different sizes and weights have different operating characteristics. AASHTO recommends that the percentage of truck traffic during peak hours be determined for design purposes. In most cases, truck traffic operates steadily throughout the day. Truck traffic is expressed as a percentage of the total traffic during the design hour. This recommendation is based on vehicle classification counts performed by DOT&PF on College Road at the Bentley Mall.

4.0 FUTURE LEVEL-OF-SERVICE

A level-of-service analysis was performed for the previously identified intersections and roadway segments using the 2020 and 2030 traffic projections. The analysis utilized Synchro SimTraffic version 7 software by Trafficware and the Highway Capacity Manual. The following tables summarize the results of this analysis. Figures 18 through 21 present a graphical presentation of the LOS analysis. Appendix F contains the LOS worksheets.

Table 4-1 2020 Signalized Intersection HCM LOS

Intersection	Delay (sec/veh)	V/C Ratio	LOS
Johansen – College	75.2	1.07	E
Johansen - Hunter	94.4	1.13	F
Johansen – Old Steese	161.4	1.33	F
Johansen – Steese Exp.	117	1.20	F
College – Bentley Trust Road	77.0	1.20	E
College – Old Steese	77.5	1.18	E
College – Steese Exp.	54.9	0.81	D
Old Steese – Helmericks Ave	145.6	1.42	F
Steese Exp. – Trainor Gate	30.0	0.77	C

Table 4-2 2020 Un-Signalized Intersection HCM LOS

Intersection	Delay (sec/veh)	V/C Ratio	LOS
Merhar - Hunter			
Movement 1 (WB)	82.9	1.05	F
Movement 2 (EB)	7427	53.74	F
Merhar – Herb Miller			
Movement 1 (WB)	1.4	0.04	A
Movement 2 (NB)	34.4	0.81	D
Merhar – Old Steese			
Movement 1 (EB)	14.6	0.34	B
Movement 2 (WB)	14.3	0.20	B
Helmericks Ave – Herb Miller			
Movement 1 (NB)	178.7	1.37	F
Movement 2 (SB)	347.8	1.66	F
Old Steese – Chace Dr			
Movement 1 (EB)	39.5	0.76	E
Movement 2 (WB)	19.7	0.24	C
Old Steese – Bentley Trust Road			
Movement 1 (EB)	503.9	1.99	F
Movement 2 (NBL)	0.9	0.12	A
Old Steese – Bus Barn Rd			
Configuration not supported			
by HCM analysis			
Old Steese – Blair Rd			
Movement 1 (EB)	Beyond Limit	Beyond Limit	F
Movement 2 (WB)	20.3	0.11	C
Old Steese – Sadler Way			
Movement 1 (WB)	24.1	0.22	C
Movement 2 (SBL)	0.2	0.03	B

Table 4-3 2020 Roadway Segment HCM LOS

Roadway	Running Time (sec)	Posted Speed (MPH)	Arterial Speed (MPH)	LOS
Bentley Trust Road				
College – Old Steese	76.5	30	18.3	C
College Road			10.6	E
Johansen Exp – Bentley Trust Rd	24.0	35	10.9	E
Bentley Trust Rd – Old Steese	21.8	35	13.3	E
Old Steese to Steese Exp.	55.6	35	9.5	F
Helmericks Avenue				
Old Steese – Herb Miller Blvd	39.8	30	14.9	D
Johansen Expressway			16.4	E
College Rd – Hunter St	46	55	6.5	F
Hunter St – Old Steese	25.9	55	11.6	F
Old Steese – Steese Exp.	27.3	55	21.5	D
Old Steese Highway			9.8	F
College Rd – Helmericks Ave	22.1	35	9.4	F
Helmericks Ave – Johansen Exp.	38.3	35	11.5	E
Steese Expressway			19.5	E
College Rd – Trainor Gate Rd	14.1	45	20.8	E
Trainor Gate Rd – Johansen Exp.	28.1	55	33.4	C

Table 4-4 2030 Signalized Intersection HCM LOS

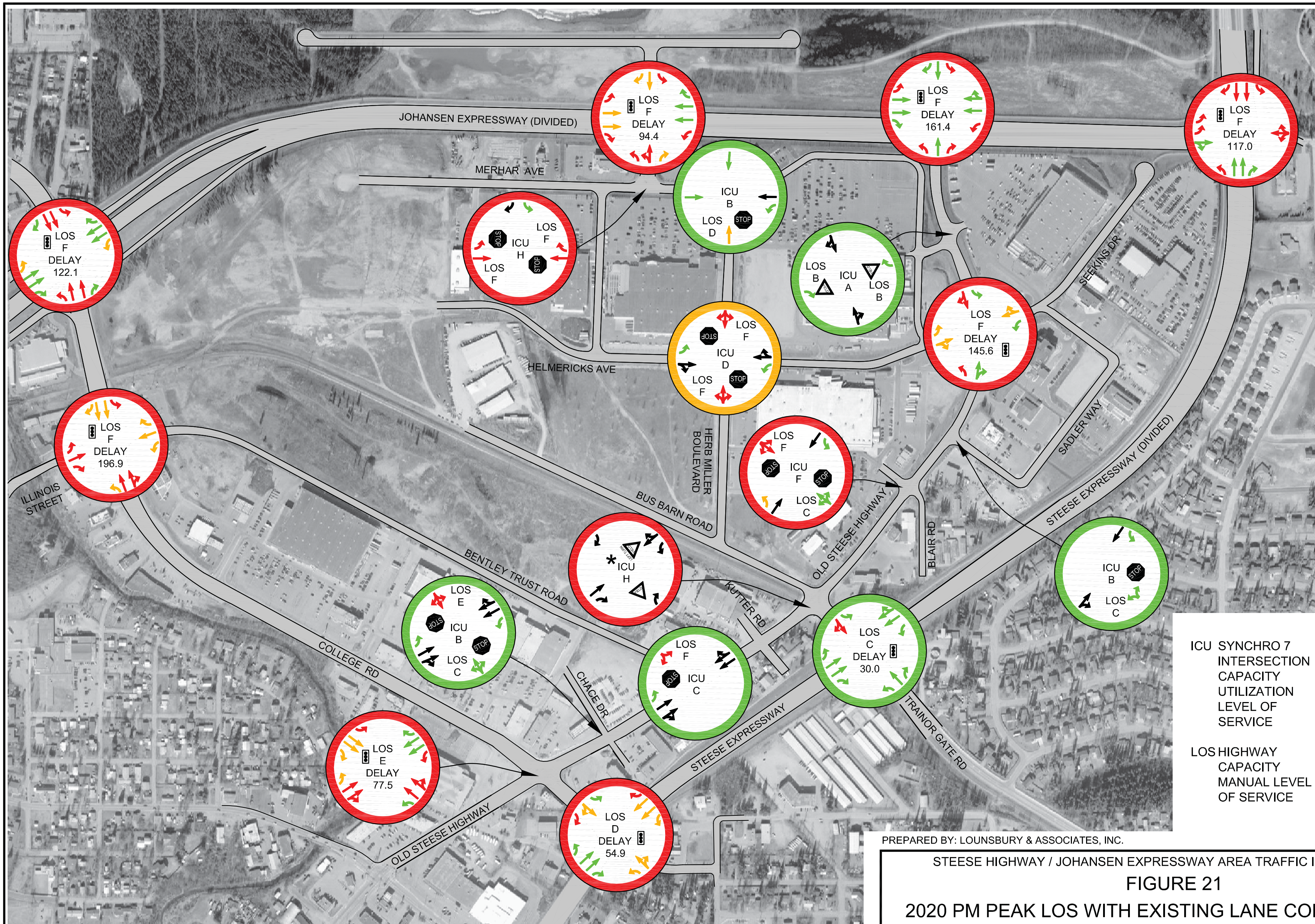
Intersection	Delay (sec/veh)	V/C Ratio	LOS
Johansen – College	122.1	1.13	F
Johansen - Hunter	114.2	1.22	F
Johansen – Old Steese	194.4	1.49	F
Johansen – Steese Exp.	153.7	1.32	F
College – Bentley Trust Road	112.6	1.38	F
College – Old Steese	110.0	1.34	F
College – Steese Exp.	64.6	0.89	E
Old Steese – Helmericks Ave	182.9	1.57	F
Steese Exp. – Trainor Gate	35.5	0.82	D

Table 4-5 2030 Un-Signalized Intersection HCM LOS

Intersection	Delay (sec/veh)	V/C Ratio	LOS
Merhar - Hunter			
Movement 1 (WB)	297.6	1.59	F
Movement 2 (EB)	Beyond Limit	Beyond Limit	F
Merhar – Herb Miller			
Movement 1 (WB)	1.3	0.04	A
Movement 2 (NB)	62.8	0.97	F
Merhar – Old Steese			
Movement 1 (EB)	17.0	0.43	C
Movement 2 (WB)	16.3	0.26	C
Helmericks Ave – Herb Miller			
Movement 1 (NB)	331.5	1.62	F
Movement 2 (SB)	612.0	2.24	F
Old Steese – Chace Dr			
Movement 1 (EB)	93.5	1.02	F
Movement 2 (WB)	57.9	0.63	F
Old Steese – Bentley Trust Road			
Movement 1 (EB)	748.1	2.53	F
Movement 2 (NBL)	0.9	0.15	A
Old Steese – Bus Barn Rd			
Configuration not supported			
by HCM analysis			
Old Steese – Blair Rd			
Movement 1 (EB)	Beyond Limit	Beyond Limit	F
Movement 2 (WB)	24.4	0.17	C
Old Steese – Sadler Way			
Movement 1 (WB)	32.5	0.36	D
Movement 2 (SBL)	0.2	0.04	B

Table 4-6 2030 Roadway Segment HCM LOS

Roadway	Running Time (sec)	Posted Speed (MPH)	Arterial Speed (MPH)	LOS
Bentley Trust Road				
College – Old Steese	76.5	30	18.2	C
College Road			8.3	F
Johansen Exp – Bentley Trust Rd	24.0	35	8.0	F
Bentley Trust Rd – Old Steese	21.8	35	10.3	E
Old Steese to Steese Exp.	55.6	35	8.2	F
Helmericks Avenue				
Old Steese – Herb Miller Blvd	39.8	30	12.6	E
Johansen Expressway			14.4	F
College Rd – Hunter St	46	55	4.8	F
Hunter St – Old Steese	25.9	55	9.9	F
Old Steese – Steese Exp.	27.3	55	20.3	E
Old Steese Highway			7.8	F
College Rd – Helmericks Ave	22.1	35	7.2	F
Helmericks Ave – Johansen Exp.	38.3	35	10.3	E
Steese Expressway			17.0	E
College Rd – Trainor Gate Rd	14.1	45	19.5	E
Trainor Gate Rd – Johansen Exp.	28.1	55	32.8	C



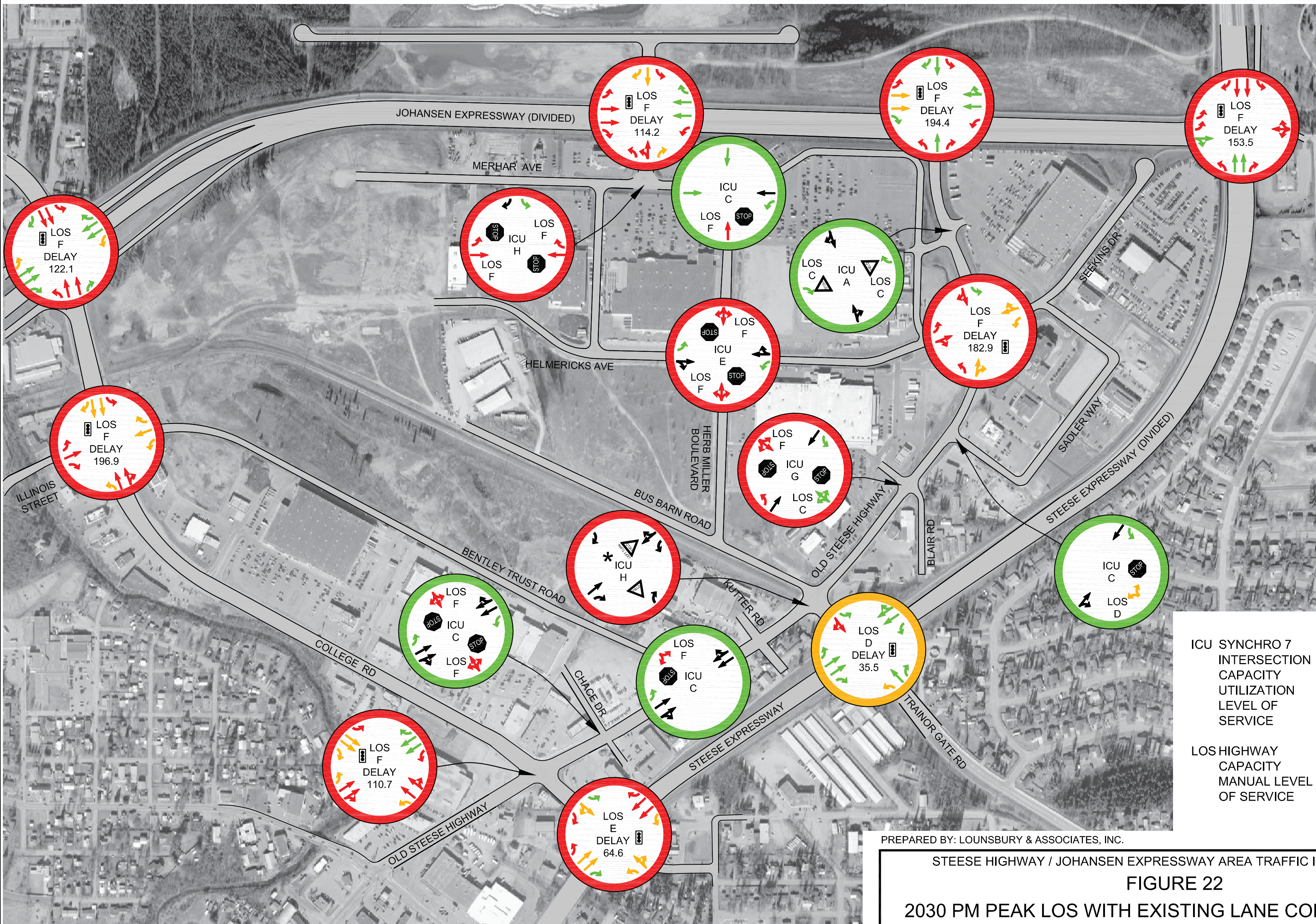
PREPARED BY: LOUNSBURY & ASSOCIATES, INC.

STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 21

2020 PM PEAK LOS WITH EXISTING LANE CONFIGURATION

APRIL 2009



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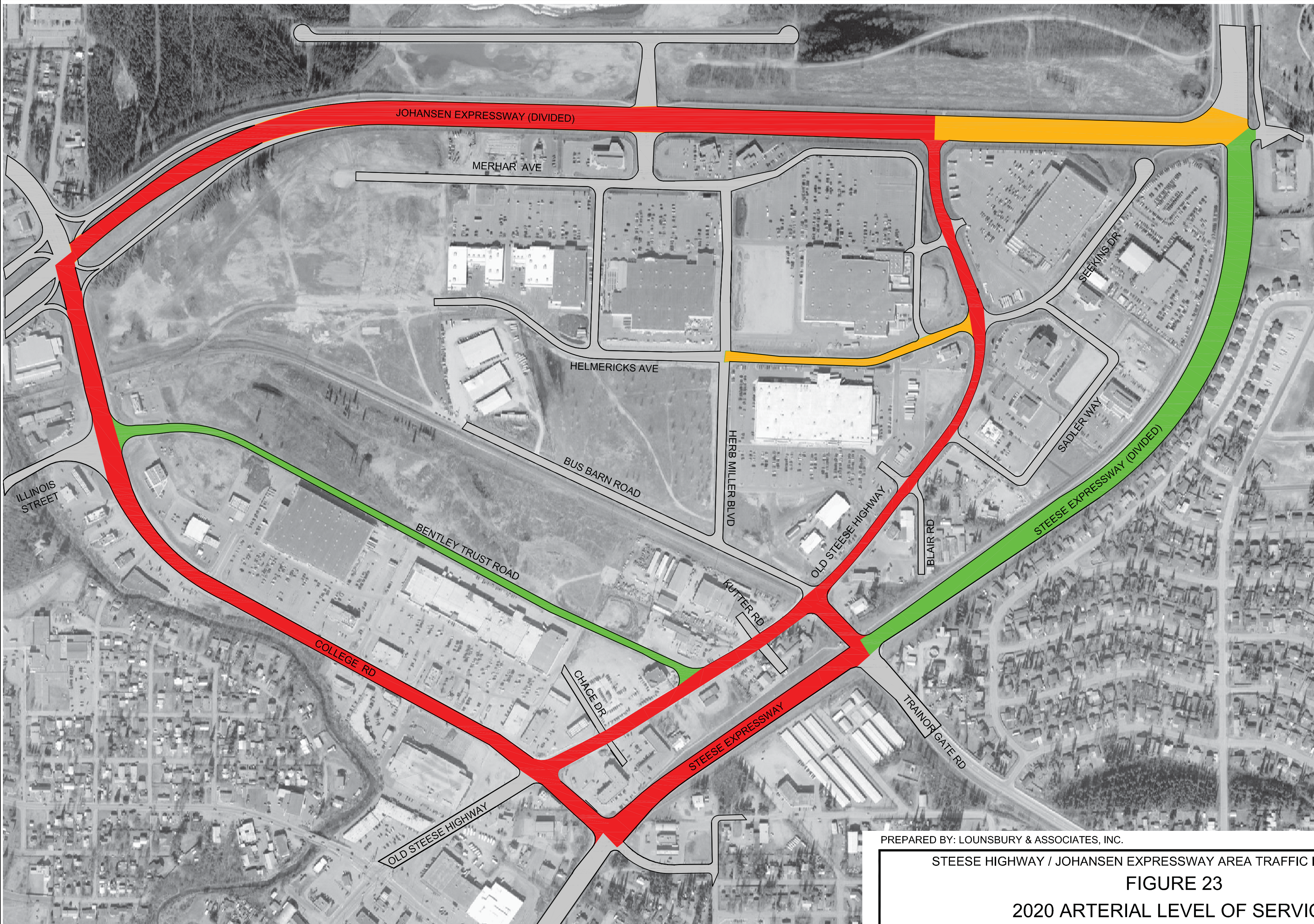
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 22

2030 PM PEAK LOS WITH EXISTING LANE CONFIGURATION



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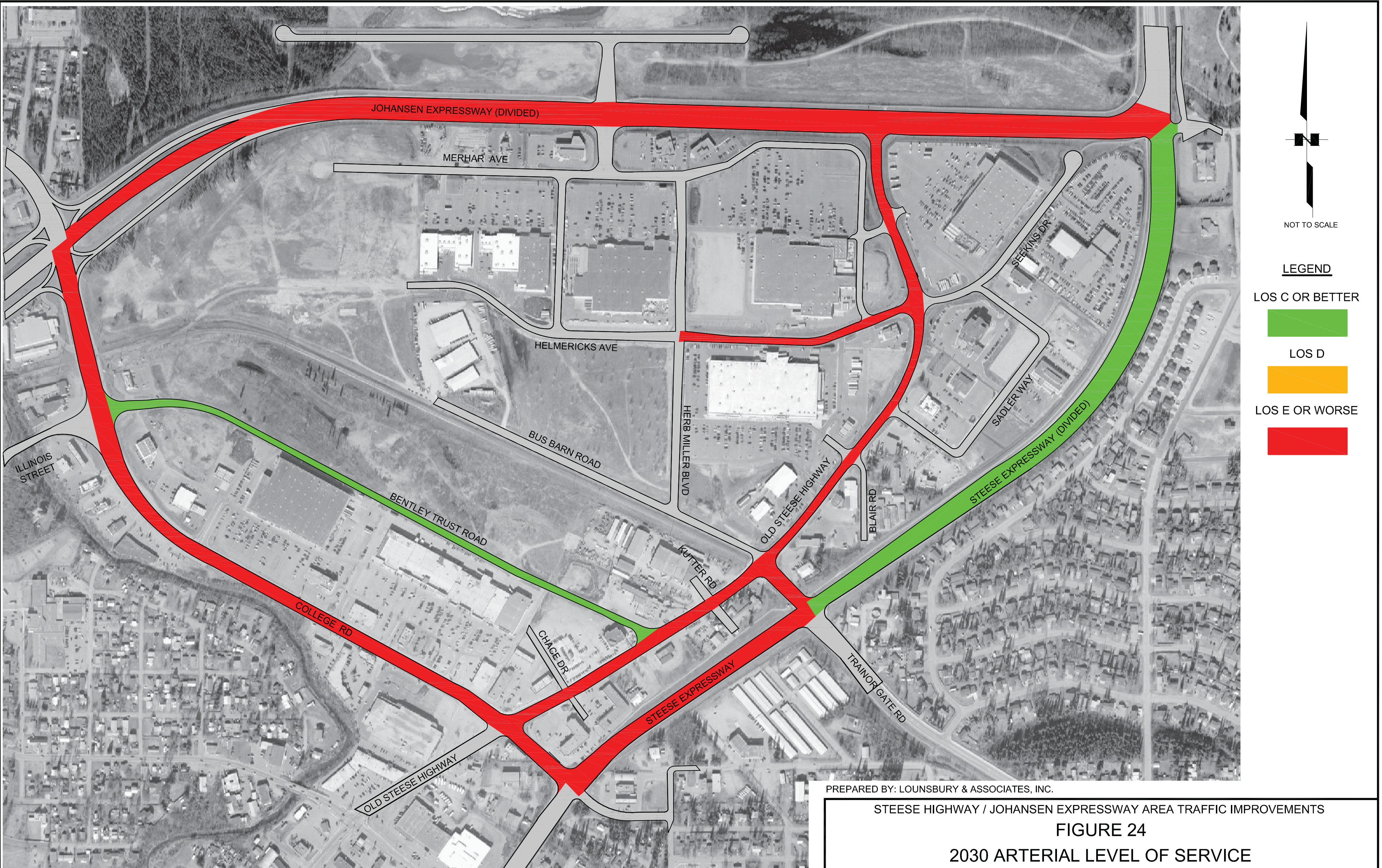
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 23

2020 ARTERIAL LEVEL OF SERVICE

APRIL 2009



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STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 24

2030 ARTERIAL LEVEL OF SERVICE

APRIL 2009

4.1 Level-of-Service Methodology

The same methods utilized in the analysis of the road network under existing traffic conditions were maintained in the analysis of future level-of-service. Synchro SimTraffic version 7 was the main analytical tool utilized for this analysis. Arterial LOS analysis was performed using Synchro 7 which incorporates the methods presented in chapter 15 of the HCM.

Existing roadway and intersection configurations were maintained for the future year analysis. Existing signal timings and peak hour factors were also maintained for future year analysis. The percent trucks used in the analysis of future conditions was maintained at 6% for all intersections and roadway segments, the same value used for the existing year analysis.

4.2 2020 and 2030 Intersection Specific Analysis

The following sections provide a detailed analysis of each intersection's individual approaches and movements LOS for 2020 and 2030.

- ***Johansen Expressway & College Road Intersection***

The Johansen Expressway/College Road intersection is expected to deteriorate from an existing LOS of C to a LOS E with a delay of 75 seconds in 2020 and a LOS of F with a delay of 122 in 2030. The intersection's volume to capacity ratio for both 2020 and 2030 exceeds 1. Movements of concern are College Road through and left turns along with Johansen Expressway left turns.

- ***Johansen Expressway & Hunter Street Intersection***

This fully actuated signalized intersection is expected to deteriorate from an existing LOS of C to a LOS of F in 2020 and 2030 with 94 seconds of delay in 2020 and 114 seconds of delay in 2030. The intersection's volume to capacity ratio for both 2020 and 2030 exceeds 1. Movements of concern include all left turn movements, Hunter Street through movements and eastbound Johansen Expressway through traffic.

- ***Johansen Expressway & Old Steese Highway Intersection***

The Johansen Expressway/Old Steese Highway intersection is expected to deteriorate from an existing LOS of C to a LOS of F in 2020 and 2030 with 161 seconds of delay in 2020 and 194.4 seconds of delay in 2030. The intersection's volume to capacity ratio for both 2020 and 2030 exceeds 1. Movements of concern are all left turns along with Old Steese Highway right turns.

- ***Johansen Expressway & Steese Expressway Intersection***

This intersection is expected to deteriorate from an existing LOS E to a LOS F in 2020 and 2030. Intersection delays are expected to be 117 seconds in 2020 and 154 seconds in 2030. The intersection's volume to capacity ratio for both 2020 and 2030 exceeds 1. Eastbound and northbound lefts are anticipated to function at LOS F in 2020 and 2030. All southbound movements are expected to operate at LOS F in 2020 and 2030 along with the westbound approach. The highest projected peak hour movement is the 2030 eastbound left turn at 1501 vehicles per hour. This movement is currently conveyed through dual left turn lanes requiring its own signal phase.

- ***College Road & Bentley Trust Road Intersection***

This intersection is currently operating at a LOS of D. It is expected to operate at a LOS E with a delay of 77 seconds in 2020 and at a LOS of F with a delay of 113 seconds in 2030. The intersection's volume to capacity ratio for both 2020 and 2030 exceeds 1. All intersection movements are of concern in 2020 and 2030.

- ***College Road & Old Steese Highway Intersection***

This intersection is currently operating at a LOS of D. It is expected to operate at a LOS E with a delay of 78 seconds in 2020 and at a LOS of F with a delay of 110 seconds in 2030. The intersection's volume to capacity ratio for both 2020 and 2030 exceeds 1. All intersection movements with the exception of southbound throughs and westbound lefts are of concern in 2020 and 2030.

- ***College Road & Steese Expressway Intersection***

This intersection is currently operating at a LOS of D. It is expected to operate at a LOS D with a delay of 55 seconds in 2020 and at a LOS of E with a delay of 65 seconds in 2030. The intersection's volume to capacity ratio for 2020 and 2030 is expected to be 0.81 and 0.89 respectively. All intersection movements with the exception of the northbound approach and westbound lefts are of concern in 2020. All intersection movements with the exception westbound lefts are of concern in 2030.

- ***Old Steese Highway & Helmericks Avenue Intersection***

This signalized intersection currently operates at a LOS of C. It is anticipated to operate at a LOS of F in 2020 and 2030 with delays of 146 seconds in 2020 and 183 seconds in 2030. Volume to capacity ratios are expected to reach approximately 1.5 by 2030. The southbound through movement is at LOS F in 2020 and declines further in 2030. Northbound lefts operate at LOS F in 2020 and also deteriorate in 2030. Northbound left movements exceed all other movements during the peak hour at 650 vehicles in 2020 and approach 700 vehicles per hour in 2030.

- ***Steese Expressway & Trainor Gate Road Intersection***

This intersection currently operates at LOS C. It is anticipated to operate at a LOS C in 2020 and LOS D in 2030. Volume to capacity ratios are expected to be 0.82 by 2030. Movements of concern are eastbound throughs and westbound lefts.

- ***Merhar Avenue & Hunter Street Intersection***

This 2-way stop controlled intersection is controlled in the east and west directions with free southbound movements. The intersection currently operates at ICU C. The intersection is anticipated to operate at ICU H in 2020 and 2030. The eastbound and westbound approaches are expected to continue at operate at a LOS F, as they currently function, with delay increasing in 2020 and 2030.

- ***Merhar Avenue & Herb Miller Boulevard Intersection***

This is a 2-way stop controlled intersection with north and south movements stop controlled. The north leg of this intersection is the Chili's Driveway Access and the east leg of this intersection is Wal-Mart parking lot access. The intersection currently operates at ICU A. The intersection is anticipated to operate at ICU B in 2020 and at ICU C in 2030. The northbound approach is expected to operate at LOS D in 2020 and at LOS F in 2030.

- ***Merhar Avenue & Old Steese Highway Intersection***

This intersection is actually two yield controlled right-in/right-out driveway accesses with Old Steese Highway movements operating free. The Wal-Mart parking lot is served by the west leg and Home Depot's parking lot is served by the east leg. This intersection functions at ICU A currently and is expected to operate at ICU A in 2020 and 2030.

- ***Helmericks Avenue & Herb Miller Boulevard Intersection***

This intersection is 2-way stop controlled with east and west movements operating free. The intersection currently operates at ICU A. The intersection is anticipated to operate at ICU D in 2020 and at ICU E in 2030. The northbound and southbound approaches are expected to operate at LOS F in 2020 and 2030.

- ***Old Steese Highway & Chace Drive Intersection***

This intersection is 2-way stop controlled with north-south movements operating free. The intersection currently operates at ICU A. The intersection is anticipated to operate at ICU B in 2020 and at ICU C in 2030. The eastbound approach is expected to operate at LOS E in 2020 and at LOS F in 2030 with the westbound approach operating at LOS F in 2030.

- ***Old Steese Highway & Bentley Trust Road Intersection***

This intersection is stop controlled for eastbound traffic with north-south movements operating free. The intersection currently operates at ICU A. The intersection is anticipated to operate at ICU C in 2020 and 2030. The eastbound approach is expected to operate at LOS F in 2020 and 2030.

- ***Old Steese Highway & Bus Barn Road Intersection / Trainor Gate Road***

This intersection is unsignalized with yield conditions for westbound and southbound movements. Individual HCM movement LOS or delay cannot be determined as the HCM does not support this type of intersection control. The intersection currently operates at ICU E. The intersection is anticipated to operate at ICU H in 2020 and 2030.

- ***Old Steese Highway & Blair Road Intersection***

This intersection is 2-way stop controlled with north-south movements operating free. The intersection currently operates at ICU D. The intersection is anticipated to operate at ICU F in 2020 and at ICU G in 2030. Eastbound movements along with northbound left turns are of concern in 2020 and 2030, operating at LOS F in 2030. Eastbound movements function with a delay outside the bounds of HCM determination in both 2020 and 2030.

- ***Old Steese Highway & Sadler Way Intersection***

This intersection is stop controlled with north-south movements operating free. The intersection currently operates at ICU A. The intersection is anticipated to operate at ICU B in 2020 and at LOS C in 2030. The westbound approach is expected to operate at LOS D in 2030.

4.3 2020 and 2030 Arterial Level of Service Analysis

The following sections provide a detailed analysis of each roadway's segment LOS.

- ***Steese Expressway – College Road to Johansen Expressway***

Overall, the Steese Expressway from College Road to Johansen Expressway currently operates at LOS D and is expected to operate at LOS E in 2020 and 2030. The segment of Steese Expressway from College Road to Trainor Gate Road currently operates at LOS D and is expected to function at LOS E in 2020 and 2030. From Trainor Gate Road to the Johansen Expressway this arterial currently operates at LOS B and is expected to function at LOS C in 2020 and 2030.

- ***Old Steese Highway – College Road to Johansen Expressway***

This arterial's number of lanes and medians varies over its length. South of Trainor Gate Road, the arterial is a five lane street with two lanes in each direction with a two-way left turn lane. Between Trainor Gate and Helmericks Avenue, the highway is a three lane road with one lane in each direction and a two-way left turn lane. Between Helmericks Avenue and Johansen Expressway, the arterial is a two lane road with a continuous center median.

Overall, the Old Steese Highway from College Road to Johansen Expressway currently operates at LOS E and is expected to operate at LOS F in 2020 and 2030. The segment of Old Steese Highway from College Road to Helmericks Avenue currently operates at LOS E and is expected to function at LOS F in 2020 and 2030. From Helmericks Avenue to Johansen Expressway the Old Steese Highway currently operates at LOS E and is expected to operate at LOS E in 2020 and 2030.

- ***College Road – Johansen Expressway to Steese Expressway***

Overall, College Road from Johansen Expressway to Steese Expressway currently operates at LOS D and is expected to operate at LOS E in 2020 and at LOS F in 2030. College Road from Johansen Expressway to Bentley Trust Road currently operates at LOS D and is expected to operate at LOS E in 2020 and at LOS F in 2030. From Bentley Trust Road to the Old Steese Highway, this segment currently operates at LOS D and is expected to operate at LOS E in 2020 and 2030. The segment from Old Steese Highway to Steese Expressway currently operates at LOS E and is expected to operate at LOS F in 2020 and 2030.

- ***Johansen Expressway – College Road to Steese Expressway***

The Johansen Expressway from College Road to Steese Expressway currently operates at LOS D and is expected to operate at LOS E in 2020 and LOS F in 2030. The segment from College Road to Hunter Street currently operates at LOS F and is expected to operate at LOS F in both 2020 and 2030. From Hunter Street to Old Steese Highway, this segment currently operates at LOS E and is expected to operate at LOS F in 2020 and 2030. The last segment, from Old Steese Highway to Steese Expressway, currently operates at LOS C and is expected to operate at LOS D in 2020 and at LOS E in 2030.

- ***Hunter Street – Johansen Expressway to Merhar Avenue***

This street is approximately 240 feet long. An arterial analysis is not applicable.

- ***Merhar Avenue – Hunter Street to Herb Miller Boulevard***

Due to this roadway's segment length and intersection control, arterial analysis is not applicable.

- ***Helmericks Avenue – Herb Miller Boulevard to Old Steese Highway***

The segment of Helmericks Avenue from Herb Miller Boulevard to Old Steese Highway currently operates at LOS C and is expected to operate at LOS D in 2020 and at LOS E in 2030.

- ***Sadler Way – Old Steese Highway to Helmericks Avenue***

Due to this roadway's geometry, intersection control and available traffic volume information, arterial analysis is not applicable.

- ***Bentley Trust Road – College Road to Old Steese Highway***

Bentley Trust Road currently functions at LOS C between College Road and Old Steese Highway. It is expected that this roadway will continue to operate at LOS C in 2020 and 2030.

5.0 MITIGATION STRATEGIES

The analyses of existing and future traffic conditions identified those facilities that are operating and/or are anticipated to operate below acceptable levels of service. The purpose of mitigation strategies is to improve vehicular and pedestrian mobility for both current and anticipated traffic conditions. The mitigation strategies considered in this study are presented in the following sections.

5.1 No-Build Strategy

As the area develops, the road network will likely continue to operate below acceptable levels of service. Viable mitigation strategies exist that maintain or improve mobility within the study area. Therefore, the no-build strategy does not meet the objectives of this project and was eliminated from further consideration.

5.2 Strategies Eliminated from Further Consideration

Conceptual strategies aimed at increasing capacity and/or redistributing traffic volumes were generated for intersections and roadways within the project area. If a strategy did not address current or anticipated needs, did not meet the purpose of this study, or was determined to have unacceptable consequences, it was eliminated from further consideration. The following strategies were considered, but eliminated:

- *Cloverleaf interchange at Johansen Expressway & Steese Expressway.* This strategy requires significant acquisition of ROW. Alternatives exist that improve the level of service at this location without requiring large amounts of ROW.
- Cloverleaf *interchange at Johansen Expressway & College Road.* This strategy requires significant acquisition of ROW. Alternatives exist that improve the level of service at this location without requiring large amounts of ROW.
- *Diamond Interchange at Johansen Expressway & College Road*. This strategy does not meet future traffic demand at this intersection. Alternatives exist that meet both current and future traffic demands.
- *Indirect Left-turn Strategies.* These strategies redirect left-turn movements at intersections to become through and right-turn movements. While these strategies improve operations at an individual intersection, they require additional improvements be made at other intersections. Alternatives exist that improve operations but do not require improvements to successive intersections.
- *Dual Roundabout System at Trainor Gate Road & Old Steese Highway and Steese Expressway*. The proximity of the railroad tracks presents prohibitive ROW and operational challenges. Other alternatives exist that address the needs of these locations.
- *Three Roundabout System at Hunter Street & Johansen Expressway, Hunter Street & Merhar Avenue, and Merhar Avenue & Herb Miller Boulevard*. Alternatives exist that meet the purposes of this project while improving operations at these locations.
- *Raised railroad throughout the development area*. Implementation of this strategy is dependent on the Alaska Railroad. The goals of this project can be met without constructing a raised rail facility.

- *Additional four-leg intersection(s) on the Steese Expressway*. Adding connections that require additional four-leg intersections will require additional intersection control that diminishes the functionality of the Steese Expressway. Other strategies that meet the purposes of this project and do not require access control changes or restrictions to the Steese Expressway operations are workable.
- *Steese Expressway – Old Steese Highway Connections*. This strategy provides for a southbound exit from the Steese Expressway to the north segment of Sadler Way and a northbound left-turn to the south segment of Sadler Way. The purpose of this strategy is to allow additional access to the development area from the Steese Expressway. Development of this strategy will reroute traffic to intersections already anticipated to operate below acceptable levels of service in the future. Therefore, this strategy does not meet the goals of this study and was eliminated from further consideration.

5.3 Pedestrian and Bicycle Provisions

As discussed in Section 2.2, existing pedestrian facilities are limited and are generally not found within the Bentley Trust development area. This study incorporates both attached sidewalks and separated pathways as part of individual mitigation strategies. Combinations and alternatives to pedestrian facilities such as shared roadways with dedicated bike lanes or pedestrian facility (sidewalk or pathway) on one side of the road were not considered but could be included as the mitigation strategies are advanced. The design of pedestrian facilities should evaluate accessibility and safety for road and rail crossing locations.

In addition to the pedestrian facilities identified in the intersection and roadway mitigation strategies, extending the pedestrian network along the Old Steese Highway between Trainor Gate Road and the Johansen Expressway will increase pedestrian mobility. Extending the pathway along the east side of the Steese Expressway from the existing termini to the Johansen Expressway will improve connectivity among pedestrian facilities.

5.4 Intersection Mitigation Strategies

Major traffic routes providing access to the study area are the Johansen Expressway, Steese Expressway, and College Road. The intersections located on these roadways are key points to transition traffic to distribution and collector roadways. As such, each intersection must have sufficient capacity to accommodate existing and anticipated traffic volumes.

Mitigation strategies were developed to address immediate needs and long-term needs of the study intersections. Interim strategies address the immediate needs of intersections and individual turning movements currently operating below acceptable levels of service, and are intended to maintain the existing levels of service for a short time while a long-term strategy is implemented. These strategies will likely involve a limited design effort, may not require a full-scale design study report (DSR), may be implemented in one year or less, and minimize both ROW acquisition and utility relocation.

Long-term strategies address facilities anticipated to operate below acceptable levels of service in 2030. These strategies will likely involve a comprehensive design phase, may require a detailed DSR, are expected to take more than one year to implement, and may require significant ROW acquisition and utility relocation. At some intersections multiple long-term strategies were analyzed. While these strategies address anticipated deficiencies, changes to the road network will affect traffic patterns at individual intersections. A number of the long-term intersection strategies consider the road network mitigation strategies described in Section 5.5.

Analyses of intersection mitigation strategies utilized Synchro/SimTraffic 7, the Highway Capacity Manual, RODEL 1 roundabout analysis software (maximum allowable v/c ratio of 0.85), and the methodologies established in Section 2.5 of this study. Level-of-service analysis worksheets for the intersection mitigation strategies are included as Appendix G. A summary of the interim intersection mitigation strategies is shown in Table 5-1. A summary of long-term intersection mitigation strategies is presented in Table 5-2. Conceptual layouts of long-term intersection mitigation strategies are shown in Figure 25 through Figure 34.

Table 5-1 Interim Mitigation Strategies Summary

Intersection	Interim Strategy	Resulting 2008 LOS
Johansen Expressway & College Road	Requires long-term strategy	N/A
Johansen Expressway & Hunter Street	2 NB left-turn lanes 1 NB shared through/right-turn lane Adjust Signal Timing	C
Johansen Expressway & Old Steese Highway	Requires long-term strategy	N/A
Johansen Expressway & Steese Expressway	2 NB left-turn lanes	D
College Road & Illinois/Bentley Trust Road *(DOT proposed lane configuration)*	2 WB through lanes 1 exclusive WB right-turn lane 2 SB left-turn lanes	D
College Road & Old Steese Highway	2 NB left-turn lanes 2 SB left-turn lanes 1 SB right-turn slip lane	D
College Road & Steese Expressway	2 NB left-turn lanes 1 SB right-turn slip lane	D
Old Steese Highway & Trainor Gate Road	Requires long-term strategy	N/A
Old Steese Highway & Blair Road	Requires long-term strategy	N/A
Old Steese Highway & Helmericks Avenue	Add 1 right turn lane to all approaches	C
Steese Expressway & Trainor Gate Road	Interim Strategy not necessary	N/A
Helmericks Avenue & Herb Miller Boulevard	Interim Strategy not necessary	N/A
Merhar Avenue & Hunter Road	Requires long-term strategy	N/A

As intersection mitigation strategies are implemented, queue lengths should be evaluated in successive design phases. Prior to implementing intersection mitigation strategies, determine traffic queue lengths for the nearest controlled intersections. The final design should provide for adequate queue storage at existing and proposed intersections, and ensure that operations of the proposed strategies are not adversely affected by anticipated queues.

Table 5-2 Long-term Intersection Mitigation Strategies Summary

Intersection	Mitigation Strategy	2030 Potential LOS[1]	
		From	*To*
Johansen Expressway & College Road	Roundabout Interchange	F	A (north) A (south)
Johansen Expressway & Hunter Street	See Section 6.5[2]	F	C
Johansen Expressway & Old Steese Hwy.	See Section 6.5[2]	F	N/A
Johansen Expressway & Steese Expressway	Multilane Roundabout	F	B
	Continuous Flow Intersection		B
	Roundabout Interchange		B
	EB left-turn Flyover		C
	Directional Interchange[3]		N/A
College Road & Illinois/Bentley Trust Road	Multilane Roundabout	F	B
College Road & Old Steese Highway	Multilane Roundabout	F	B
College Road & Steese Expressway	Multilane Roundabout	F	A
Old Steese Highway & Trainor Gate Road	Close Old Steese south of RR crossing	H *(ICU)*	A *(ICU)*
Old Steese Highway & Blair Road	None Identified	E *(ICU)*	N/A
Old Steese Highway & Helmericks Avenue	Single Lane Roundabout	F	C
Steese Expressway & Trainor Gate Road	None Identified	D	N/A
Helmericks Avenue & Herb Miller Boulevard	Single Lane Roundabout	E *(ICU)*	B
Merhar Avenue & Hunter Road	See Section 6.5[2]	E *(ICU)*	B *(ICU)*

1. The 2030 Potential LOS refers to how well an intersection may operate with the mitigation strategy in place. Design details related to each strategy should be determined in subsequent implementation phases.
2. Section 6.5 Road System Mitigation Strategies.
3. Free movements do not have a level-of-service.

- ***Johansen Expressway & College Road – Figure 25***

Interim Strategies

The current intersection configuration at this location consists of a single point urban interchange (SPUI). Maintaining or improving traffic operations requires complete reconfiguration of the interchange geometry. Therefore, mitigation strategies are considered long-term in nature and interim strategies were not identified.

Long-Term Strategies

The long term strategy identified at this intersection consists of two multi-lane roundabout intersections, commonly known as a double roundabout. Roundabouts at this location maintain the interchange characteristics and are anticipated to operate at acceptable levels of service in the future. Additional legs may be added to accommodate access to the Bentley Trust development area (see Section 5.5 Roadway Mitigation Strategies).

- ***Johansen Expressway & Hunter Street***

Interim Strategies

The interim strategies identified at this location include changes to lane configurations and signal timing adjustments. The lane configuration on the northbound Hunter Street approach should include two exclusive left-turn lanes and one shared through/right-turn lane. The signal timing should be adjusted to remove the split phase.

Long-Term Strategies

The long term strategy identified at this location is to close the south leg of Hunter Street or reroute traffic to other intersections. Although operations at this intersection may be improved, other intersections (Merhar Avenue & Hunter Street for one) are adversely affected by the proximity of this intersection. As such, employing the long-term strategies discussed in Section 5.5 will address traffic operations at this location.

- ***Johansen Expressway & Old Steese Highway***

Interim Strategies

This intersection was recently modified to include a leg north of the Johansen Expressway. Development north of the Johansen Expressway has not yet generated sufficient traffic to warrant an interim strategy. However, future traffic conditions are anticipated to warrant mitigation.

Long-Term Strategies

The long term strategy identified at this location is to close the south leg of the Old Steese Highway and/or reroute traffic to other intersections. Redistribution of traffic volumes provides the greatest benefit to traffic operations at this intersection. As such, employing the long-term strategies discussed in Section 5.5 will more fully address operational deficiencies at this location.

- ***Johansen Expressway & Steese Expressway – Figures 26, 27, 28, 29, and 30***

Interim Strategies

Traffic volumes at this location warrant two exclusive northbound left-turn lanes. This strategy will decrease the delay experienced by the northbound left-turning traffic, but will not significantly improve conditions for southbound or westbound traffic.

Long-Term Strategies

Several long-term strategies were developed for this location. These strategies include:

- *Multilane Roundabout (Figure 26)* – The long-term strategy identified at this location is a multilane roundabout with a northbound bypass lane for through movements. Development of a roundabout at this location should evaluate both morning and evening peak traffic conditions to determine the appropriate approach geometry for each leg, the need for right-turn slip lanes, and northbound bypass lane configuration. A right-in/right-out connection to the side street (Lazelle) could also be included.

- *Continuous Flow Intersection (Figure 27)* – The Continuous Flow Intersection (CFI) strategy reduces the number of signal phases at an intersection by separating the left-turn movements from the through movements. In a CFI, this is accomplished by directing left-turning traffic to the far left side of the roadway at a signalized transition placed several hundred feet upstream of the primary intersection. At the primary intersection opposing left-turns and through movements can be controlled with a single signal phase.

  The CFI concept is patented. Further development of this strategy will need to fulfill the terms of the patent. Additional consideration should be given to the distance between the transition locations and the primary intersection, coordinated signal timings, and public education.

- *Roundabout Interchange (Figure 28)* – This strategy converts the intersection to partial diamond interchange. The Steese Expressway would be raised, creating a grade separated crossing on the Steese Expressway. A roundabout would be located on the Johansen Expressway east of the Steese Expressway.

- *Eastbound Left-turn Flyover (Figure 29)* – The purpose of this strategy is to reduce the time required for left-turn phasing by allowing the eastbound left turns to bypass the signal. This strategy provides a grade separated eastbound left-turn lane. Development of this strategy should consider exit ramp placement and adequate structural design of a curved bridge. Additionally, this strategy could be considered a single phase of future interchange plans.

- *Directional Interchange (Figure 30)* – A directional interchange removes the traffic signal. This strategy requires two grade separated crossings, one of which can be the eastbound left-turn flyover discussed previously. Further development of this strategy will need to carefully plan each phase of construction to allow for adequate vertical clearance and speed transitions.

▪ ***College Road & Illinois Street/Bentley Trust Road – Figure 31***

Interim Strategies

The current Illinois Street project proposes to change the lane configuration at this intersection to include two exclusive left turn lanes on the Illinois Street approach. The interim strategy expands on the existing plan by adding two exclusive left-turn lanes on Bentley Trust Road, adding an exclusive westbound right-turn lane on College Road lane configuration to one exclusive right-turn lane, and converting the westbound shared through/right-turn lane to an exclusive through lane on College Road. Protected left-turn phasing is assumed for left-turning traffic on Illinois Street and Bentley Trust Road. These changes will maintain the existing level of service for a short time, but will not address the long-term needs.

Long-Term Strategies

A multilane roundabout was identified as a long-term mitigation strategy for this intersection. Lane configurations include two lane approaches on College Road, a two lane approach on Illinois Street, a single lane approach on Bentley Trust Road, two lane exits on College Road and Illinois Street, and a single lane exit on Bentley Trust Road.

▪ ***College Road & Old Steese Highway/College Road & Steese Expressway – Figure 32***

Interim Strategies

College Road & Old Steese Highway: Interim strategies at this intersection consist of lane configuration changes on the Old Steese Highway. These changes include two exclusive left-turn lanes on both approaches and one exclusive southbound right-turn lane. Signal timings will also need to be modified to provide protected left-turn phasing. The right-turn lane should be separated by a raised median and have a minimum storage of 100 feet. However, incorporation of the right-turn lane should consider that a similar right-turn lane was removed under a previous project to increase safety.

College Road & Steese Expressway: Interim Strategies at this intersection consist of lane configuration changes on the Steese Expressway. These changes include two exclusive left-turn lanes on the northbound approach of the Steese Expressway and one exclusive southbound right-turn lane. The right-turn lane could be separated by a raised median and have a minimum storage of 100 feet. Signal timings will also need to be modified to provide protected left-turn phasing.

If implemented, interim strategies at both intersections will provide a slight decrease in the overall delay and minimal improvement to the level-of-service for some movements under current traffic conditions. As such, these interim improvements do not fulfill the purpose and needs of this study. Long-term mitigation will be necessary to accommodate future traffic volumes.

Long-Term Strategies

A double roundabout strategy was identified as a long-term mitigation strategy at these locations. This strategy requires a double roundabout layout due to the limited distance between the intersections. Constructing a single roundabout and leaving one intersection signalized may cause one or both intersections to operate below an acceptable level of service, and should be avoided. At the College Road & Steese Expressway, a single lane approach may also be considered on the southeast leg.

- ***Old Steese Highway & Trainor Gate Road***

Interim Strategies

This intersection is located adjacent to an existing at-grade railroad crossing, and has been modified to mitigate traffic conditions identified in the Fred Meyer Store Traffic Impact Analysis. Interim strategies do not improve traffic operations at this intersection. As such, long-term improvements are necessary.

Long-Term Strategies

The long-term strategy identified at this location relies on the redistribution of traffic. Closing the Old Steese Highway just south of the railroad crossing and rerouting traffic will improve traffic operations at this intersection. This strategy will force traffic to use other routes. As such, this strategy should be employed in conjunction with the strategies discussed in Section 5.5.

Closing the Old Steese Highway may require that adequate turning space for emergency vehicles be provided. Further design should be coordinated with local emergency service providers.

- ***Old Steese Highway & Blair Road***

Interim Strategies

Interim strategies do not improve traffic operations at this intersection. The large volumes of traffic on the Old Steese Highway do not present a sufficient number of gaps for turning movements on Blair Road. As such, long-term improvements are necessary.

Long-Term Strategies

The poor level of service anticipated at this location is primarily related to store traffic. Alternative access to the store is provided from driveways on Herb Miller Boulevard and Helmericks Avenue and an exit driveway on the Old Steese Highway south of this intersection. Since alternative access is provided, employing the long-term road system strategies discussed in Section 5.5 will more fully address operational deficiencies at this location.

- ***Old Steese Highway & Helmericks Avenue – Figure 33***

Interim Strategies

The interim strategies identified at this location include adding right-turn lanes to all approaches. Based on estimated right-turn queues, each right-turn lane could be separated by a raised median and have a minimum storage of 100 feet. Based on estimated queues of the through movements on each approach the northbound right-turn lanes could be extended to 150 feet long and the southbound right-turn lane could be extended to 300 feet long to prevent queue blocking. These changes will maintain the existing level of service for a short time. Long-term mitigation is needed to address future traffic volumes.

Long-Term Strategies

The long term strategy identified at this location is a single lane roundabout. This strategy accommodates both current and future traffic volumes. The roundabout strategy at this location can be implemented in conjunction with the road system mitigation strategies discussed in Section 5.5.

- ***Steese Expressway & Trainor Gate Road***

Interim Strategies

Interim strategies do not improve traffic operations at this intersection.

Long-Term Strategies

Individual long-term strategies do not improve traffic operations at this intersection. However, development of the road system mitigation strategies discussed in Section 5.5 may result in changes to the volume of traffic that may improve traffic operations.

- ***Helmericks Avenue & Herb Miller Boulevard – Figure 34***

Interim Strategies

An interim strategy is not necessary at this location. The current intersection configuration can sustain acceptable levels of service for some time.

Long-Term Strategies

The long-term strategy identified at this location is a single lane roundabout. This strategy is intended to improve safety without sacrificing each movement's level of service. The roundabout strategy at this location can be implemented in conjunction with the road system mitigation strategies discussed in Section 5.5.

- ***Merhar Avenue & Hunter Street***

Interim Strategies

As discussed previously, traffic operations at this intersection are significantly affected by traffic at the Johansen Expressway & Hunter Street intersection. Interim strategies do not improve traffic operations at this location. Long-term mitigation is needed to address future traffic volumes.

Long-Term Strategies

The long term strategy identified at this location is to close the south leg of Hunter Street or reroute traffic to other intersections. Employing the long-term strategies discussed in Section 5.5 will address traffic operations at this location.

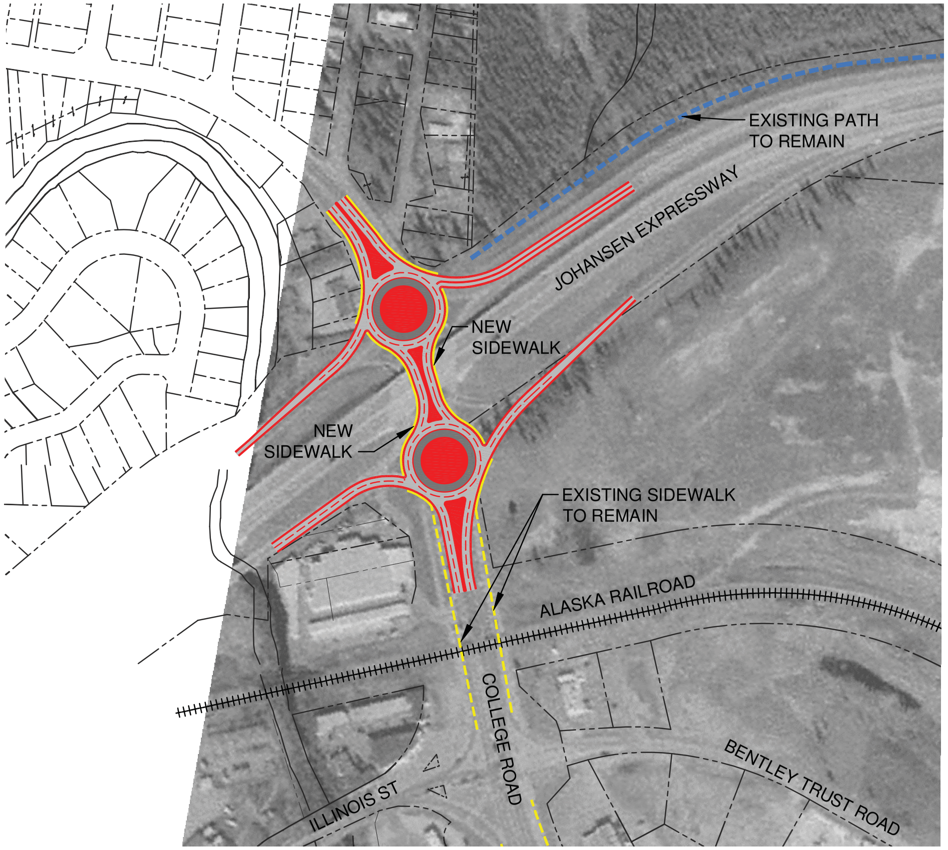
5.4.2 Intersection Strategy Implementation

As intersection mitigation strategies are advanced, design details specific to each intersection will be evaluated.

Design of roundabouts should evaluate both morning and evening peak traffic conditions to determine the appropriate sizing, approach geometry for each leg, and the need for right-turn slip lanes. Initial construction of a single lane roundabout with the intent to construct additional lanes as traffic demand increases should also be considered. Care should be taken during design efforts to ensure the safety of both motorists and pedestrians.

As stated previously, the CFI design is patented. If the CFI strategy is selected for implementation, terms of the patent will need to be followed. Additionally, implementing this strategy should include a significant public involvement effort to educate motorists about the new traffic pattern.

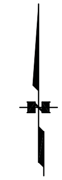
As the road network continues to expand, changes in traffic patterns can be expected. Any intersection strategy, interim or long-term, should consider the effects of the expanded road network. Signal timings at existing signalized intersections should also be evaluated on a regular basis as intersection strategies are put in place.



JOHANSEN EXP. & COLLEGE RD ROUNDABOUT INTERCHANGE		
Design & Construction	$	2,824,180
Utility Work	$	643,500
Right-of-Way Acquision	$	964,620
Total	$	4,432,300

LEGEND

EXISTING	PROPOSED	
- - - - (blue)	—— (blue)	PATH
- - - - (yellow)	—— (yellow)	SIDEWALK

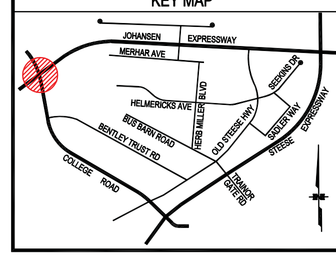


NOT TO SCALE

NOTES:

1. THE ALTERNATIVE SHOWN IN THIS FIGURE IS CONCEPTUAL IN NATURE AND SHOULD NOT BE CONSIDERED A COMPLETE DESIGN.
2. THE LOCATIONS OF ROW SHOWN IN THIS FIGURE ARE BASED ON FAIRBANKS NORTH STAR BOROUGH GRID MAPS. THIS INFORMATION WAS NOT VERIFIED IN THE FIELD AND SHOULD BE CONSIDERED APPROXIMATE.

KEY MAP



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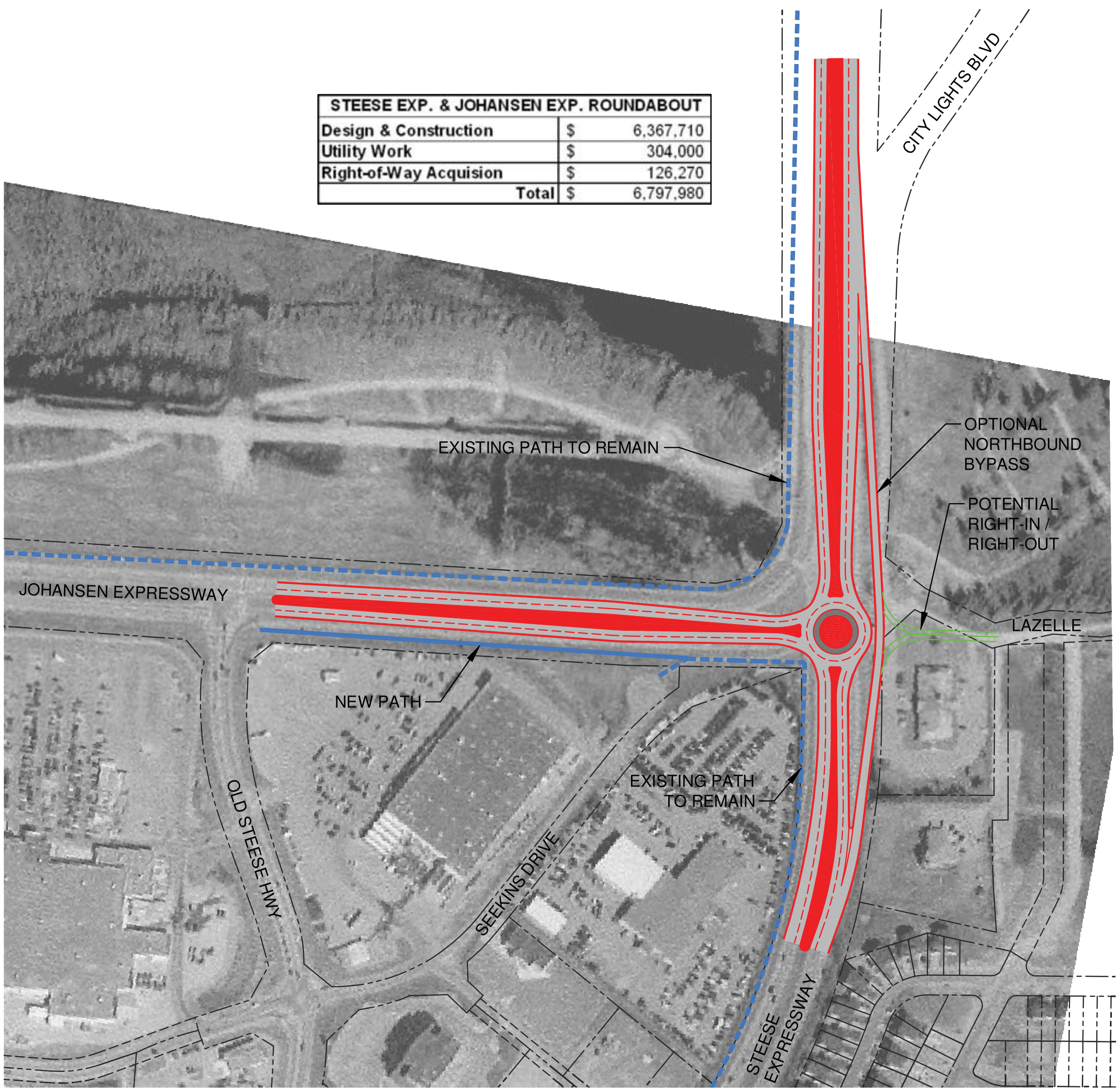
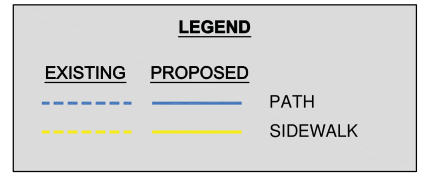
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 25

JOHANSEN EXPRESSWAY & COLLEGE ROAD ROUNDABOUT INTERCHANGE

STEESE EXP. & JOHANSEN EXP. ROUNDABOUT		
Design & Construction	$	6,367,710
Utility Work	$	304,000
Right-of-Way Acquision	$	126,270
Total	$	6,797,980





NOTES:

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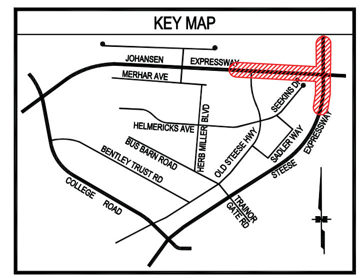

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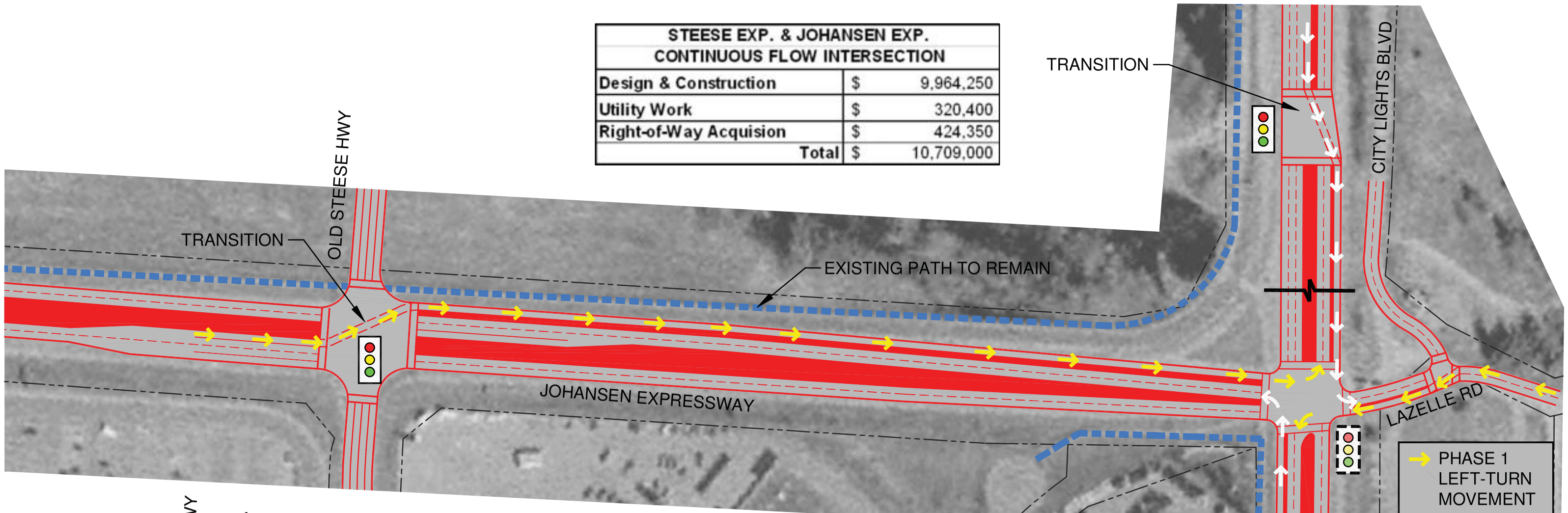
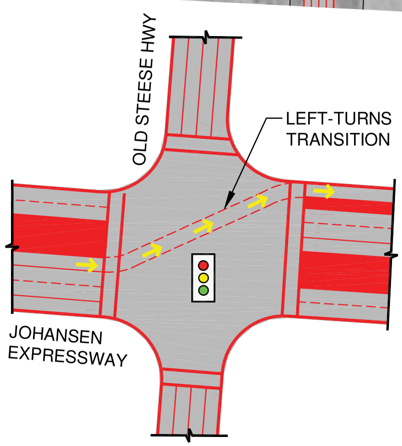
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 26

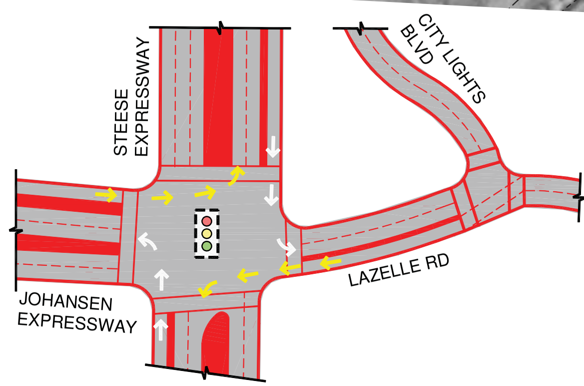
STEESE EXPRESSWAY & JOHANSEN EXPRESSWAY ROUNDABOUT

STEESE EXP. & JOHANSEN EXP. CONTINUOUS FLOW INTERSECTION		
Design & Construction	$	9,964,250
Utility Work	$	320,400
Right-of-Way Acquision	$	424,350
Total	$	10,709,000

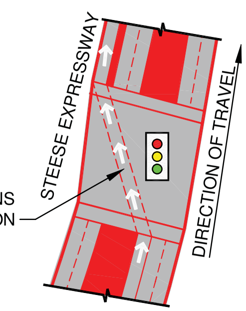




JOHANSEN EXP. & HUNTER CROSSOVER



JOHANSEN EXP. & STEESE EXP. INTERSECTION



STEESE EXPRESSWAY TYPICAL TRANSITION

LEGEND

EXISTING	PROPOSED	
- - - -	——	PATH
- - - -	——	SIDEWALK

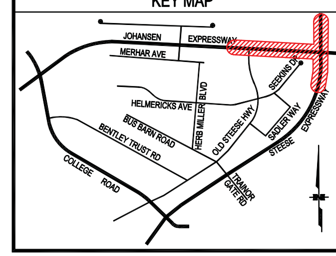
STRATEGY NOTES:

1. THE CFI DESIGN IS PATENTED . FURTHER DEVELOPMENT SHOULD ENSURE TERMS OF THE PATENT ARE FULFILLED.
2. SIGNAL COORDINATION BETWEEN TRANSITION AND PRIMARY INTERSECTION IS CRITICAL TO THE OVERALL PERFORMANCE

NOTES:

1. THE ALTERNATIVE SHOWN IN THIS FIGURE IS CONCEPTUAL IN NATURE AND SHOULD NOT BE CONSIDERED A COMPLETE DESIGN.
2. THE LOCATIONS OF ROW SHOWN IN THIS FIGURE ARE BASED ON FAIRBANKS NORTH STAR BOROUGH GRID MAPS. THIS INFORMATION WAS NOT VERIFIED IN THE FIELD AND SHOULD BE CONSIDERED APPROXIMATE.

KEY MAP



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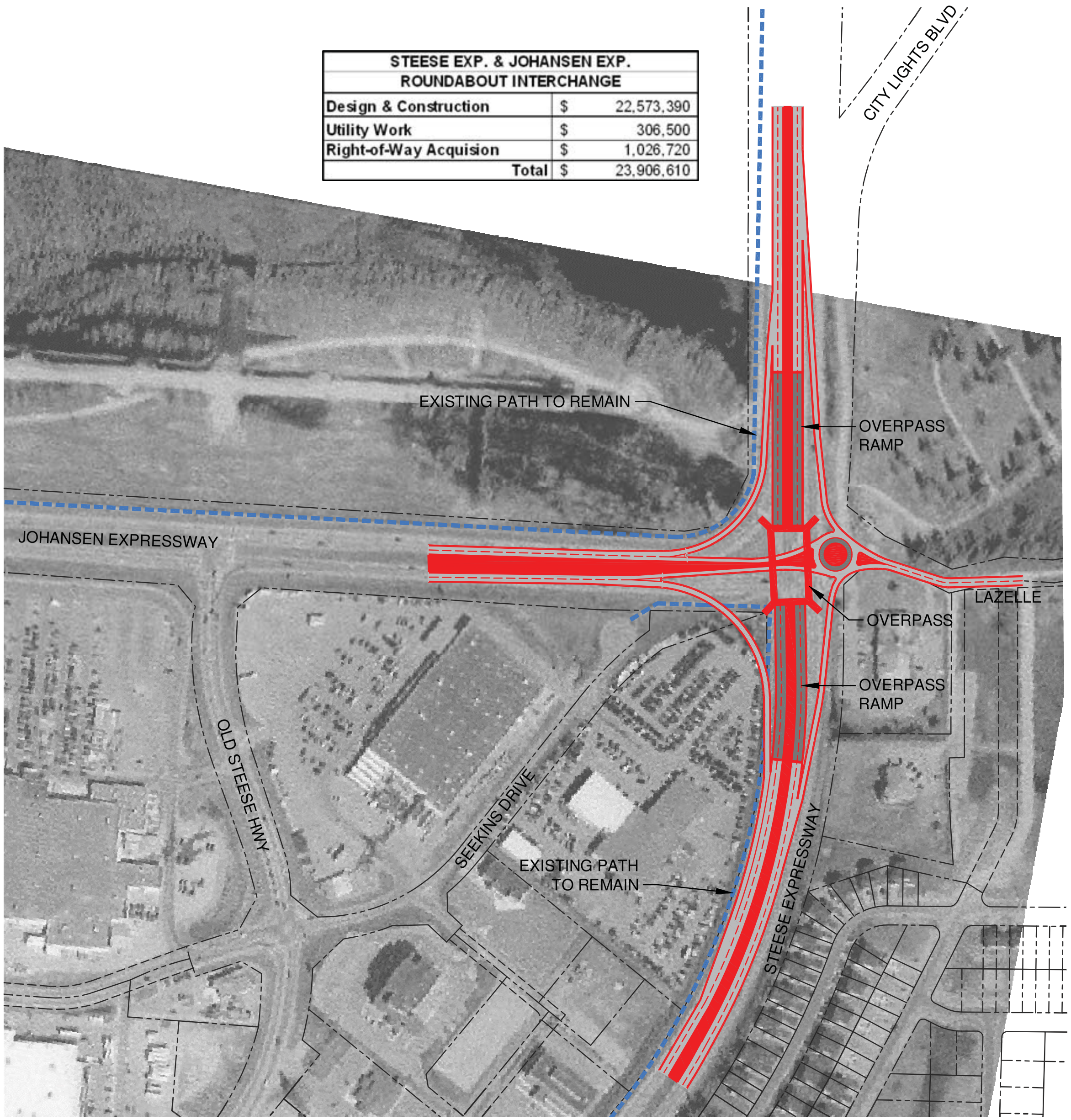
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 27

STEESE EXPRESSWAY & JOHANSEN EXPRESSWAY CONTINUOUS FLOW INTERSECTION (CFI)

STEESE EXP. & JOHANSEN EXP. ROUNDABOUT INTERCHANGE		
Design & Construction	$	22,573,390
Utility Work	$	306,500
Right-of-Way Acquision	$	1,026,720
Total	$	23,906,610



NOT TO SCALE

LEGEND

EXISTING	PROPOSED	
- - - (blue)	—— (blue)	PATH
- - - (yellow)	—— (yellow)	SIDEWALK

NOTES:

1. THE ALTERNATIVE SHOWN IN THIS FIGURE IS CONCEPTUAL IN NATURE AND SHOULD NOT BE CONSIDERED A COMPLETE DESIGN.
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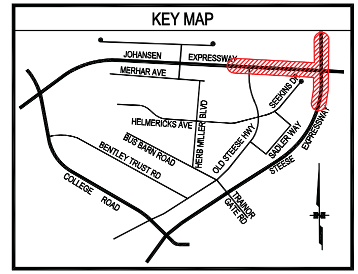
KEY MAP



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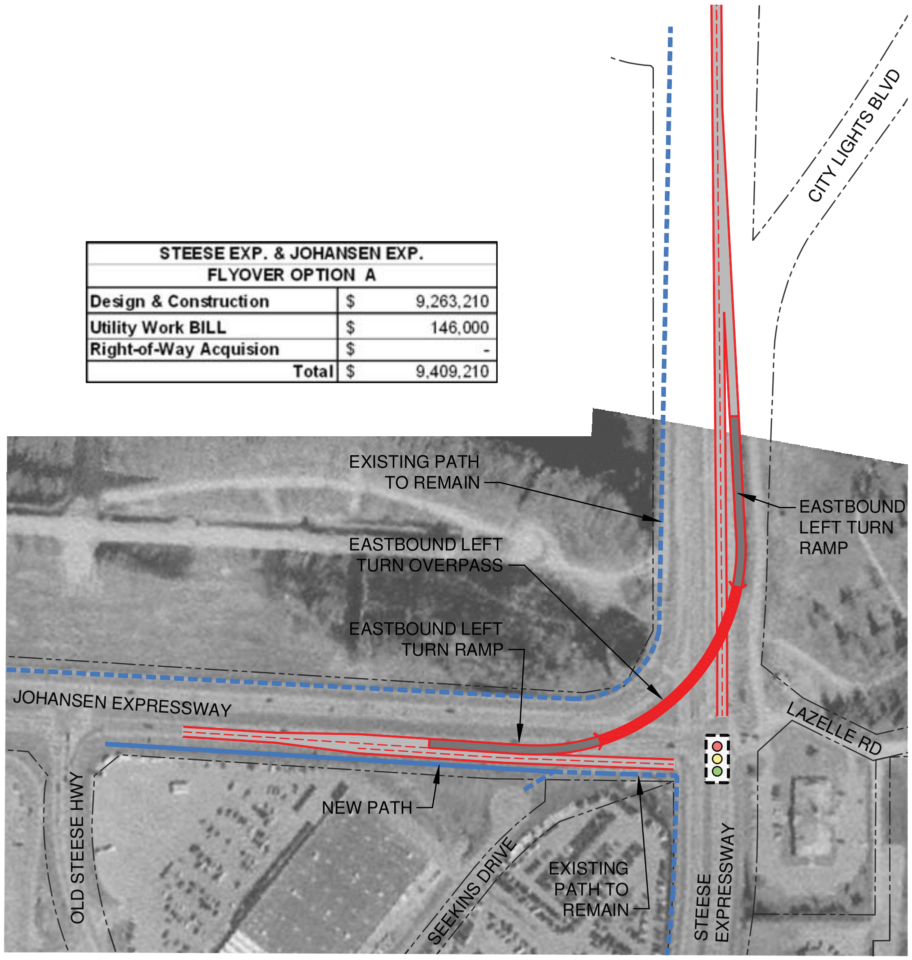
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 28

STEESE EXPRESSWAY & JOHANSEN EXPRESSWAY
ROUNDABOUT INTERCHANGE

STEESE EXP. & JOHANSEN EXP. FLYOVER OPTION A		
Design & Construction	$	9,263,210
Utility Work BILL	$	146,000
Right-of-Way Acquision	$	-
Total	$	9,409,210



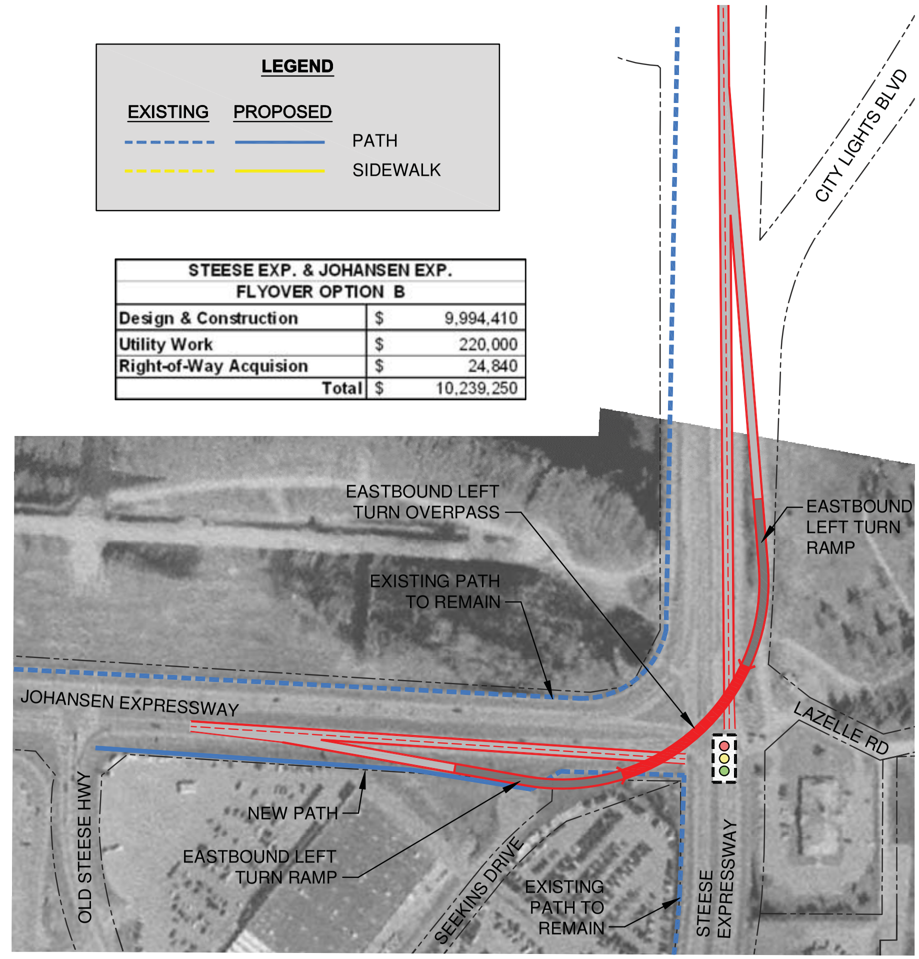
FLYOVER OPTION A

LEGEND

EXISTING	PROPOSED	
- - - (blue)	— (blue)	PATH
- - - (yellow)	— (yellow)	SIDEWALK

STEESE EXP. & JOHANSEN EXP. FLYOVER OPTION B		
Design & Construction	$	9,994,410
Utility Work	$	220,000
Right-of-Way Acquision	$	24,840
Total	$	10,239,250

NOT TO SCALE



FLYOVER OPTION B

NOTES:

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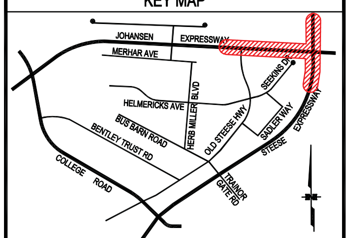
KEY MAP



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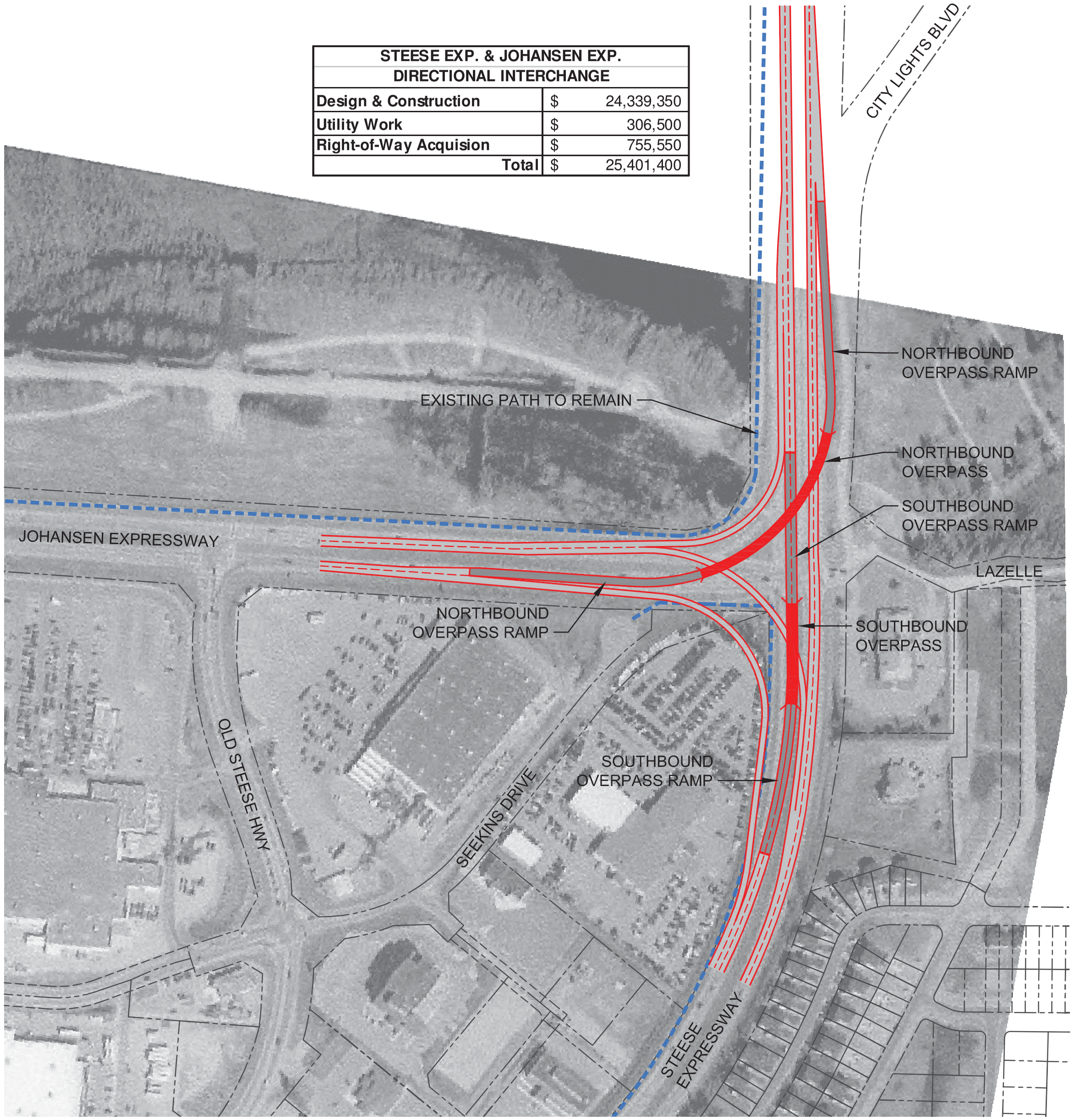
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 29

STEESE EXPRESSWAY & JOHANSEN EXPRESSWAY EASTBOUND LEFT-TURN FLYOVER

STEESE EXP. & JOHANSEN EXP. DIRECTIONAL INTERCHANGE		
Design & Construction	$	24,339,350
Utility Work	$	306,500
Right-of-Way Acquision	$	755,550
Total	$	25,401,400



NOT TO SCALE

LEGEND

EXISTING	PROPOSED	
- - - - (blue)	—— (blue)	PATH
- - - - (yellow)	—— (yellow)	SIDEWALK

NOTES:

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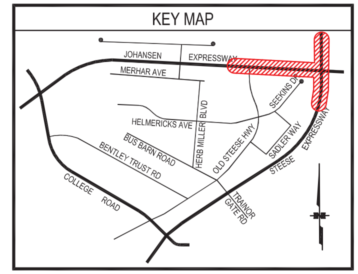
KEY MAP



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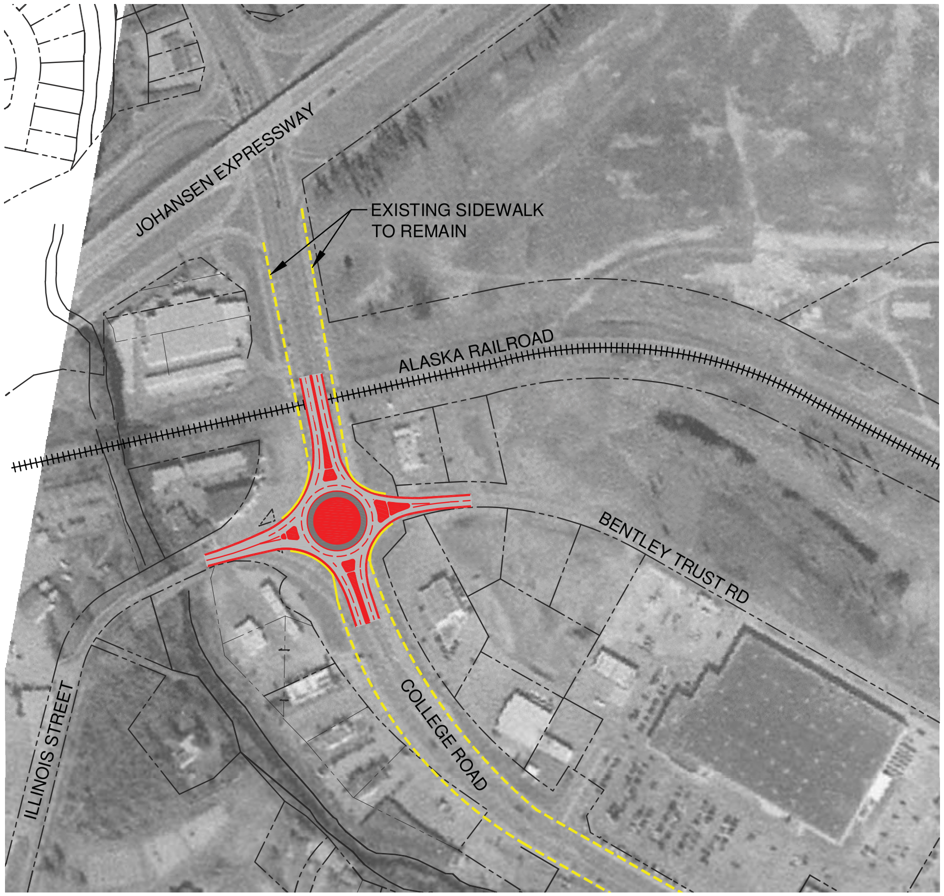
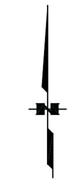
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 30

STEESE EXPRESSWAY & JOHANSEN EXPRESSWAY DIRECTIONAL INTERCHANGE





LEGEND

EXISTING	PROPOSED	
- - - - (blue)	—— (blue)	PATH
- - - - (yellow)	—— (yellow)	SIDEWALK

NOTES:

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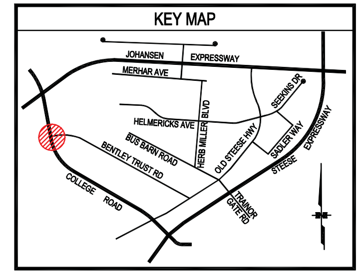
COLLEGE RD. & ILLINOIS ST - BENTLEY TRUST RD. ROUNDABOUT		
Design & Construction	$	1,616,600
Utility Work	$	558,500
Right-of-Way Acquision	$	-
Total	$	2,175,100

KEY MAP



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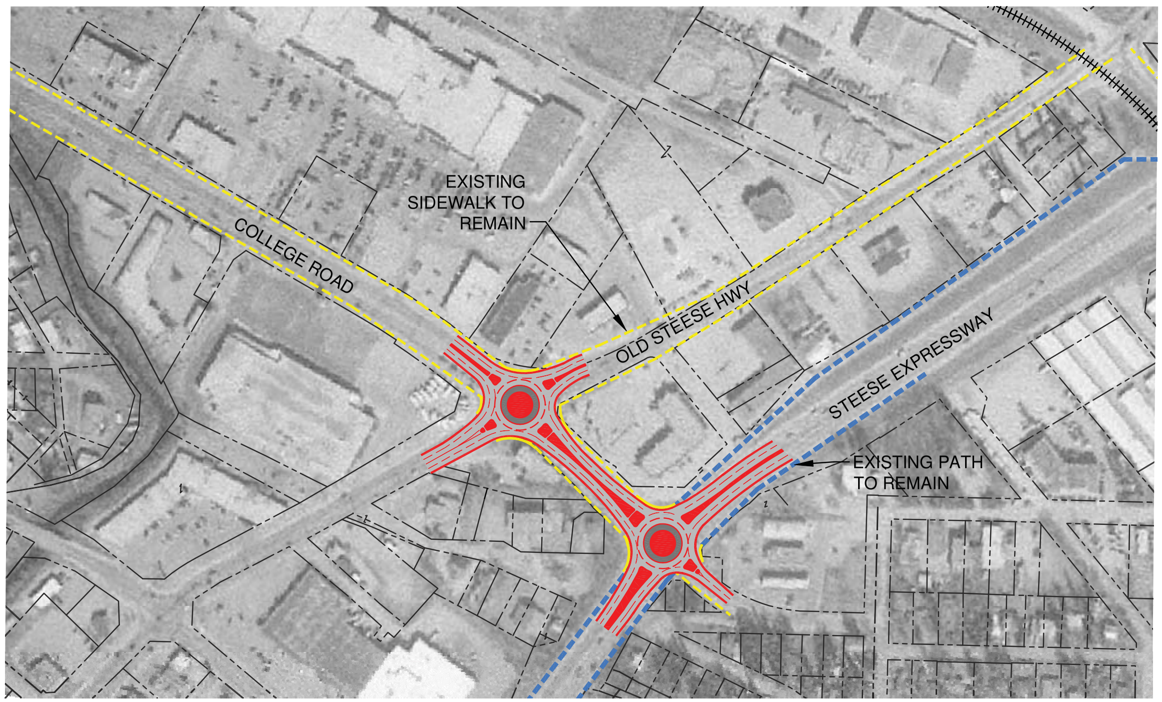
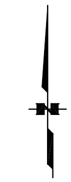
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 31

COLLEGE ROAD & ILLINOIS STREET - BENTLEY TRUST ROAD ROUNDABOUT





LEGEND

EXISTING	PROPOSED	
- - - (blue)	—— (blue)	PATH
- - - (yellow)	—— (yellow)	SIDEWALK

NOTES:

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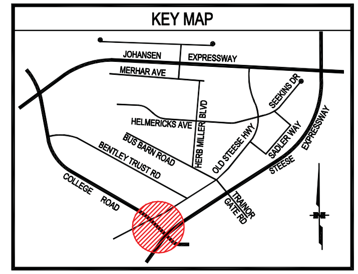
KEY MAP



COLLEGE RD & STEESE EXP. / OLD STEESE HWY ROUNDABOUTS		
Design & Construction	$	2,458,060
Utility Work	$	1,433,000
Right-of-Way Acquision	$	215,280
Total	$	4,106,340

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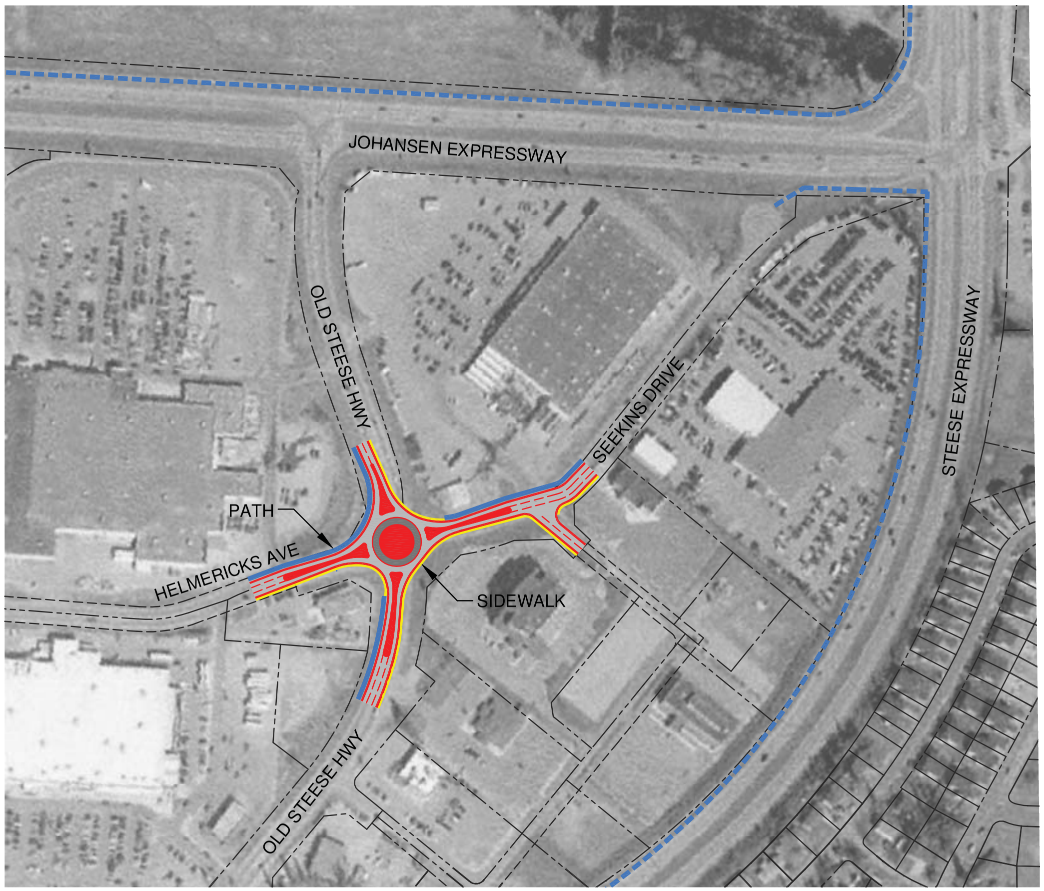
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 32

COLLEGE ROAD & STEESE EXPRESSWAY - OLD STEESE HWY ROUNDABOUTS



NOT TO SCALE

LEGEND

EXISTING	PROPOSED	
- - - - (blue)	—— (blue)	PATH
- - - - (yellow)	—— (yellow)	SIDEWALK

NOTES:

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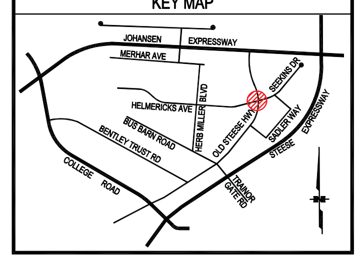
KEY MAP



HELMERICKS AVE & OLD STEESE HWY ROUNDABOUT		
Design & Construction	$	923,400
Utility Work	$	179,500
Right-of-Way Acquision	$	356,040
Total	$	1,458,940

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STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 33

HELMERICKS AVENUE & OLD STEESE HIGHWAY ROUNDABOUT

NOT TO SCALE

LEGEND

EXISTING	PROPOSED	
- - - - (blue)	—— (blue)	PATH
- - - - (yellow)	—— (yellow)	SIDEWALK

NOTES:

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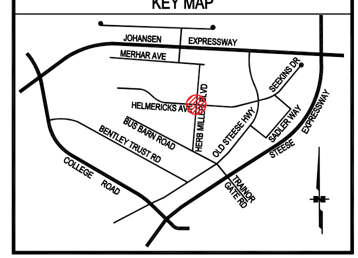
KEY MAP



HELMERICKS AVE & HERBMILLER BLVD ROUNDABOUT		
Design & Construction	$	1,157,400
Utility Work	$	748,500
Right-of-Way Acquision	$	565,110
Total	$	2,471,010

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STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 34

HELMERICKS AVENUE & HERBMILLER BOULEVARD ROUNDABOUT

5.5 Road System Mitigation Strategies

Major travel routes to the study area include the Johansen Expressway, Steese Expressway, Old Steese Highway, and College Road, and all traffic entering and exiting the study area must travel on one of these roadways. Connections between major routes, distributor roads, and collector roadways are limited or absent. The collector road network is incomplete and does not provide connections between the north and south development areas. The result is restricted mobility as large traffic volumes converge on the few connecting roadways.

The purpose of the road system mitigation strategies is to increase mobility by improving the connections between the major travel routes, distributor roads, and the collector road network within the study area. Redistribution of traffic volumes is expected and traffic patterns throughout the study area will be altered as these strategies are put in place. The arterial strategies developed in this study can be implemented individually, in conjunction with other intersection or arterial strategies, or as phases to a systematic road improvement program. Additionally, these strategies will require coordination with the area land owners, developers, the City of Fairbanks, and the Fairbanks North Star Borough.

5.5.1 Connection Strategies

The objectives of the connection strategies are to provide distribution roadways that both link the development area north of the railroad tracks to College Road and complete the collector road network. The connection strategies developed in this study include the following:

- Extend Helmericks Avenue west to the College Road & Illinois Street intersection,
- Extend Merhar Avenue west to the Bentley Trust Road and extend Helmericks Avenue to the Merhar Extension,
- Construct a new north-south roadway between Helmericks and Bentley Trust Road east of the Bus Barn, and
- Construct a new north-south roadway between Helmericks and Bentley Trust Road west of the Bus Barn.

Each connection strategy assumes a three lane roadway, one at-grade railroad crossing, and one intersection with Bentley Trust Road. These connections may also be constructed as developments continue to expand on the collector road network. Connection strategies are presented in Figures 35 through 37.

- ***Helmericks Avenue Extension – Figure 35***

Extending Helmericks Avenue to the west allows for a single, continuous east-west route through the development area, connecting the Old Steese Highway and College Road. It also utilizes Illinois Street to connect to the downtown Fairbanks area. Traffic on Helmericks Avenue should be allowed to flow continuously between the Old Steese Highway and College Road with the intersecting side streets stop controlled. Further development of this alternative should consider intersection improvements at the College Road and Illinois Street intersection and appropriate railroad crossing treatments.

- ***Merhar Avenue Extension – Figure 36***

Extending Merhar Avenue west allows for two east-west routes through the development area that connect the Old Steese Highway and College Road. Traffic on Merhar Avenue should be allowed to flow continuously between the Old Steese Highway and College Road with the intersecting side streets stop controlled. Traffic on Helmericks Avenue should be allowed to flow continuously between the Old Steese Highway and Merhar Avenue with the intersecting side streets stop controlled. A potential modification to this strategy includes routing Merhar Avenue directly into the College Road and Illinois Street intersection with a horizontal curve. Design evaluations of a horizontally curved alignment should demonstrate that sight distances and safety requirements of an at-grade railroad crossing within the curve can meet current standards. Further development of this strategy should consider storage for queues on Bentley Trust Road, intersection improvements at the College Road and Illinois Street intersection, and appropriate railroad crossing treatments.

- ***North-South Connection A and B – Figure 37***

The North-South Connection A and B strategies present additional distribution routes from within the Bentley Trust development area. Connection A connects both Merhar Avenue and Helmericks Avenue to Bentley Trust Road west of the Bus Barn and Connection B east of the Bus Barn. Both routes provide an opportunity to extend the connection to College Road. Further development of this alternative should consider adequate intersection control at Merhar Avenue, Helmericks Avenue and Bentley Trust Road as well as appropriate railroad crossing treatments. If the option of extending a road to College Road is advanced, an analysis of intersection control at the College Road intersection should be completed.

5.5.2 Distribution and Collection Strategies

The objectives of distribution and collection strategies are to improve traffic flow within the Bentley Trust development area, allow for balancing traffic volumes on area roadways, and enhance access control on major routes. These strategies include realigning the Old Steese Highway and developing a circulatory road system. Distribution and collection strategies are illustrated in Figures 38 through 40.

- ***Old Steese Highway Realignment – Figure 38***

The Old Steese Highway Realignment strategy shifts the Old Steese Highway alignment west to the Herb Miller Boulevard alignment. Since the development area is more evenly bisected with this strategy, access to developments between the existing Old Steese Highway and Herb Miller Boulevard is achieved by right-turns, reducing the number of left-turns. The existing Old Steese Highway and Hunter Street would be closed as shown in Figure 38. These closures enhance access control on the Johansen Expressway. This strategy also relocates the existing at-grade railroad crossing to the west, increasing the distance between crossings.

Further development of this strategy should consider appropriate intersection control at the Johansen Expressway, Helmericks Avenue, and Merhar Avenue. If the existing Old Steese Highway & Johansen Expressway intersection is closed, eliminating the existing median between Helmericks Avenue and Johansen Expressway should be considered. Additional options include extending the Old Steese north to Farmer’s Loop Road and improving Trainor Gate Road between the existing Old Steese Highway and the proposed Old Steese alignment.

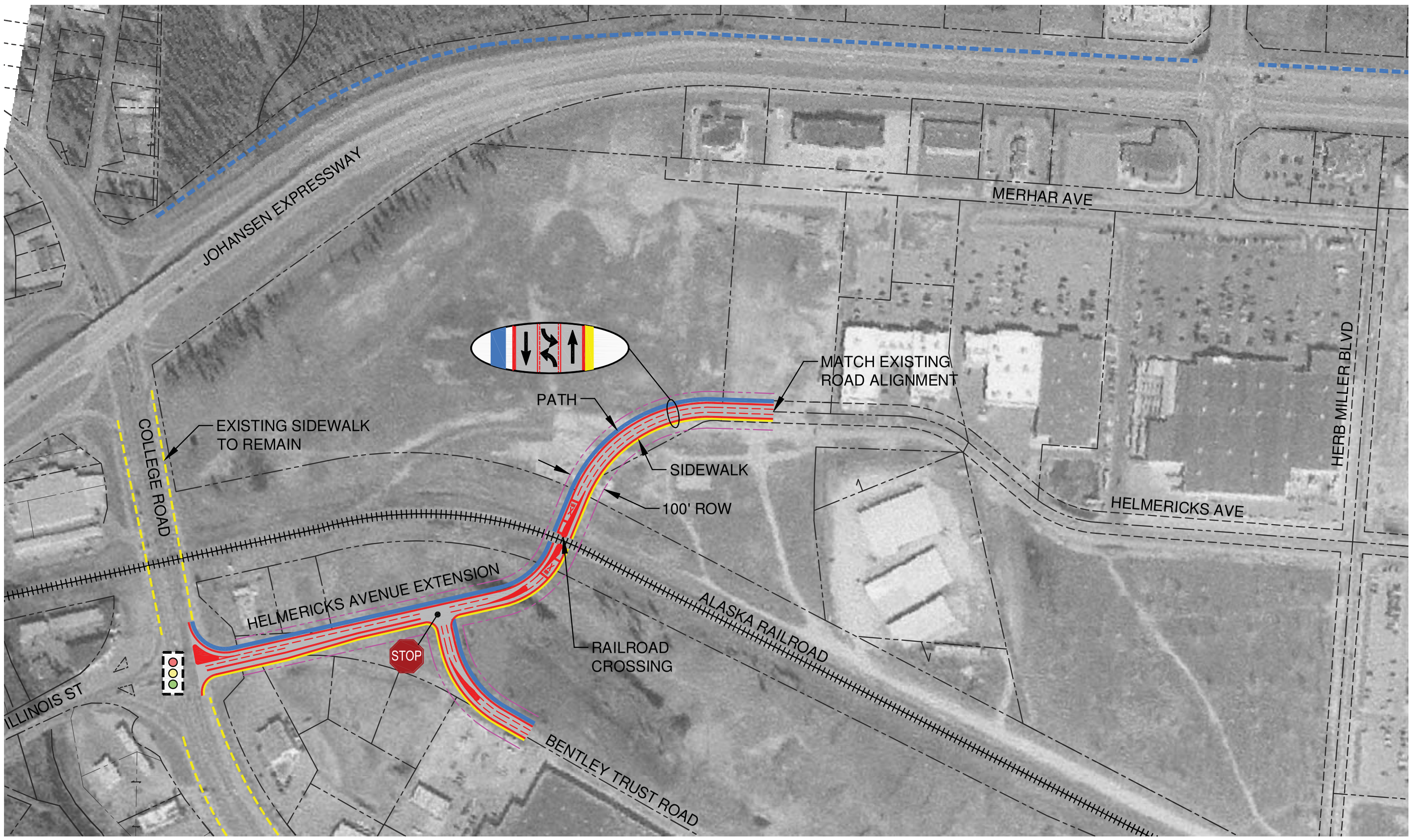
- ***Circulatory Road System – Figure 39***

The Circulatory Road System strategy formalizes the collector road network within the development area to balance east-west traffic volumes between College Road and the Old Steese Highway. Connections to major travel routes should be limited to the east and west ends of the circulatory road which requires closing Hunter Street between the Johansen Expressway and Merhar Avenue. Eastbound traffic enters the circulating roadway from the eastbound Johansen Expressway on-ramp and continues east to the Old Steese Highway. Westbound traffic enters the circulating roadway from the Old Steese Highway at Helmericks and continues west toward College Road. Westbound traffic can be directed to the Johansen Expressway & College Road intersection or to Bentley Trust Road.

Further development of this strategy should consider increasing the capacity of the Johansen Expressway & College Road intersection and determine which facility would be best suited to receive westbound (either the Johansen Expressway & College Road intersection or Bentley Trust Road). Additional options include developing the circulatory road system as a one-way couplet or as two individual bidirectional roadways. In either case, traffic on the circulatory road should be allowed to flow continuously with the intersecting side streets stop controlled. If westbound traffic is directed to Johansen Expressway & College Road intersection, a roundabout at that intersection should be considered.

- ***Bentley Trust Road Upgrade – Figure 40***

Bentley Trust Road currently provides a connection between College Road and the Old Steese Highway. Currently, this road is privately owned. The roadway will likely serve as a distribution roadway as the area develops and should be maintained as such. This strategy upgrades the existing two-lane roadway to three lanes with dedicated ROW and pedestrian facilities. Upgrades to the road can be phased as other roadway mitigation strategies are put in place.



NOT TO SCALE

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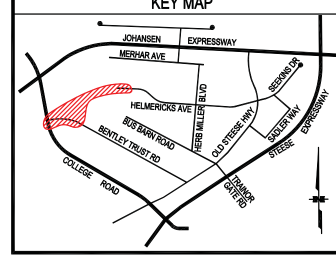
KEY MAP



HELMERICKS AVE EXTENSION		
Design & Construction	$	2,571,920
Utility Work	$	841,500
Right-of-Way Acquision	$	4,001,310
Total	$	7,414,730

LEGEND

EXISTING	PROPOSED	
- - -	——	PATH
- - -	——	SIDEWALK
—·—·—	—·—·—	RIGHT-OF-WAY

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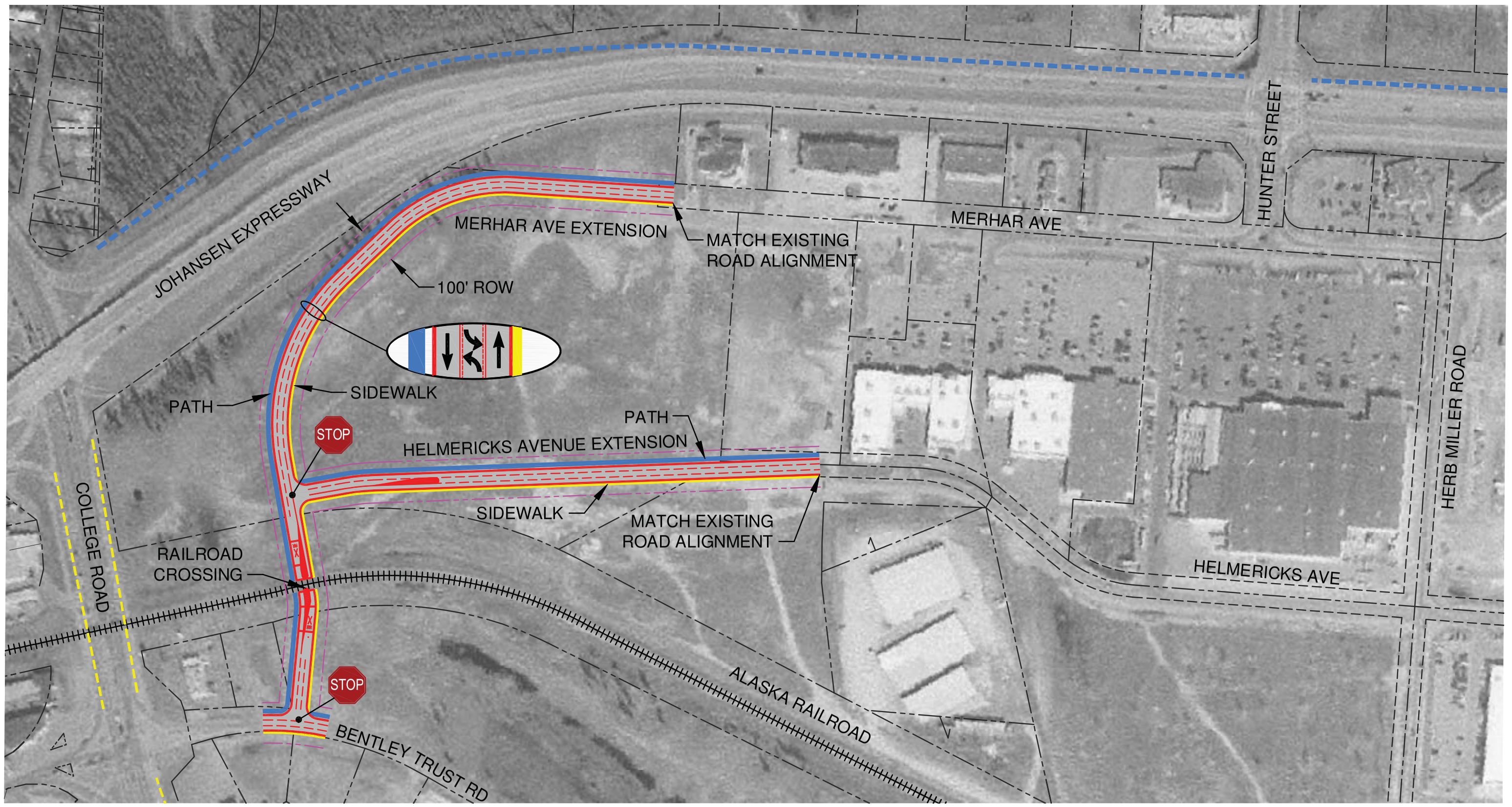
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 35
HELMERICKS AVENUE EXTENSION



LEGEND

EXISTING	PROPOSED	
- - - (blue)	— (blue)	PATH
- - - (yellow)	— (yellow)	SIDEWALK
—·— (black)	—·— (magenta)	RIGHT-OF-WAY

NOT TO SCALE

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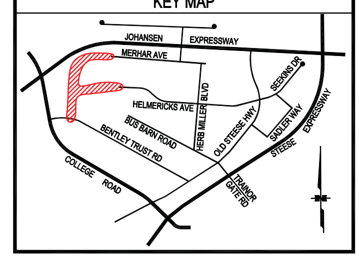
KEY MAP



MERHAR AVE EXTENSION		
Design & Construction	$	3,387,180
Utility Work	$	1,117,750
Right-of-Way Acquision	$	6,746,130
Total	$	11,251,060

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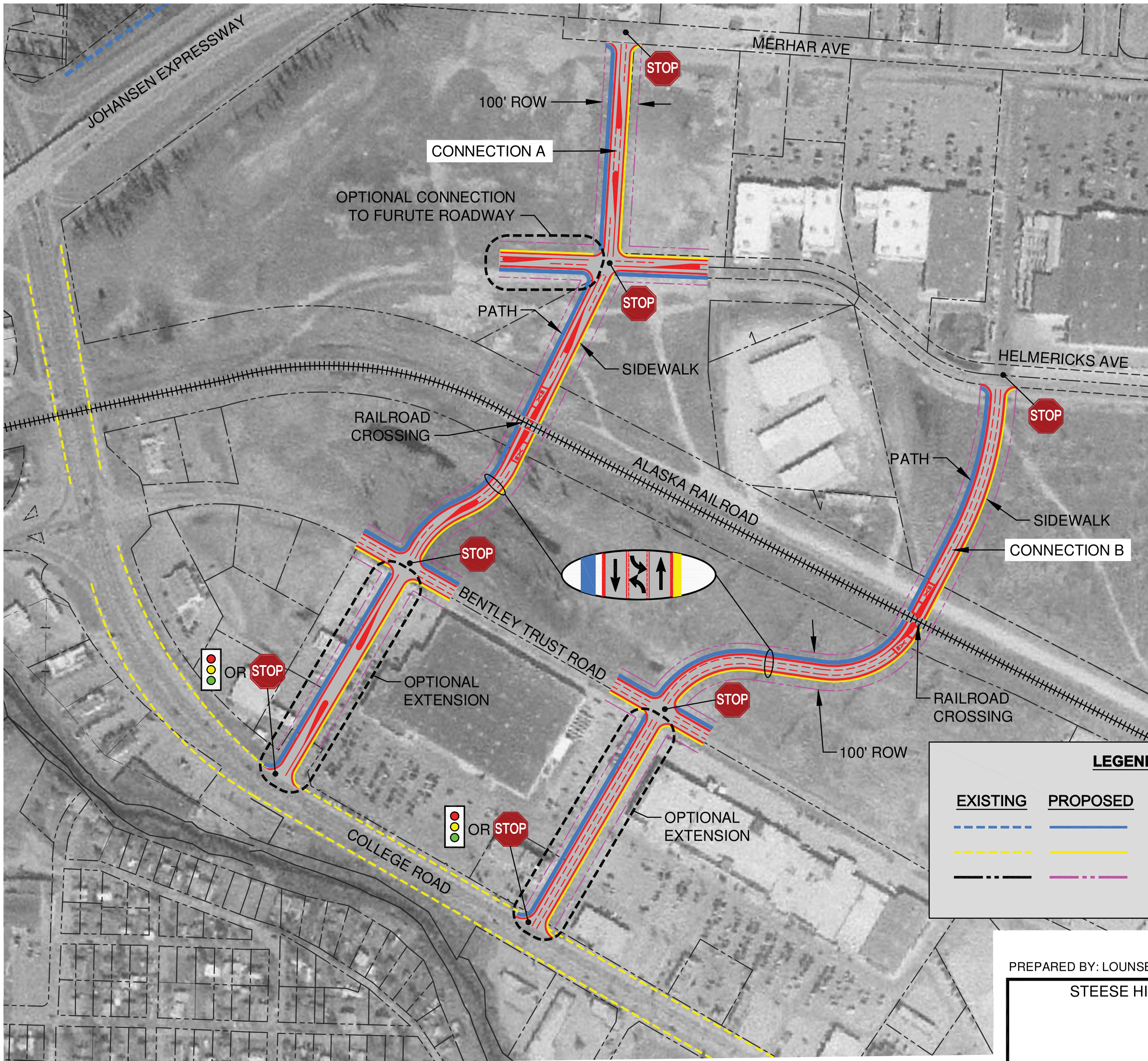
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 36
MERHAR AVENUE
EXTENSION

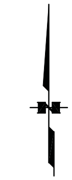


CONNECTION A NORTH		
Design & Construction	$	2,389,740
Utility Work	$	308,750
Right-of-Way Acquision	$	3,990,960
Total	$	6,689,450

CONNECTION A SOUTH (OPTIONAL EXTENSION)		
Design & Construction	$	1,337,380
Utility Work	$	276,000
Right-of-Way Acquision	$	1,126,080
Total	$	2,739,460

CONNECTION B NORTH		
Design & Construction	$	2,034,390
Utility Work	$	430,000
Right-of-Way Acquision	$	3,049,110
Total	$	5,513,500

CONNECTION B SOUTH OPTIONAL EXTENSION		
Design & Construction	$	1,342,440
Utility Work	$	875,750
Right-of-Way Acquision	$	1,355,850
Total	$	3,574,040



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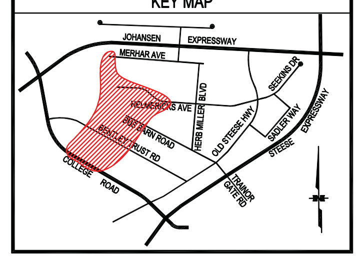
KEY MAP



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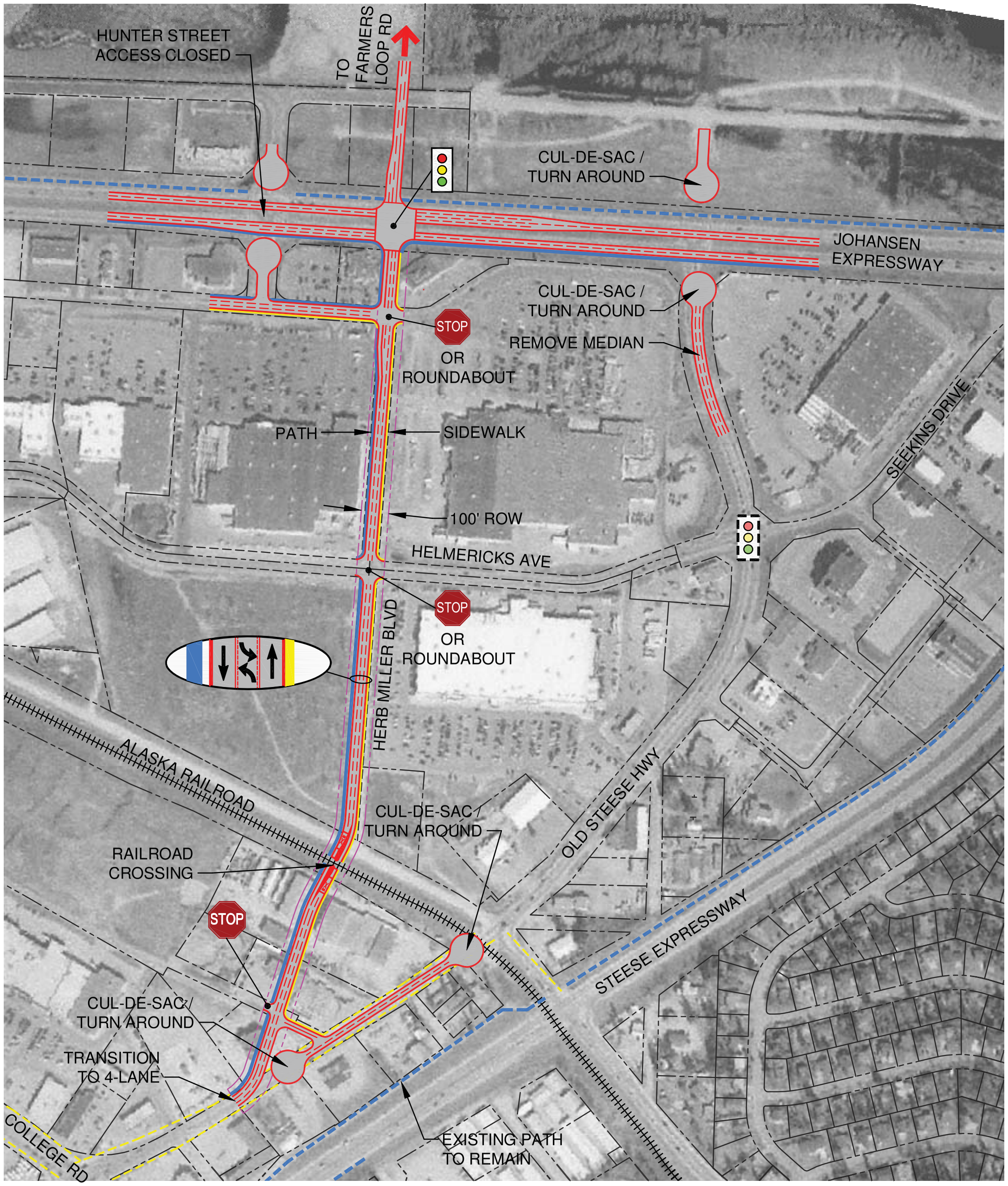
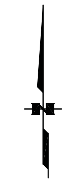
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 37
NORTH-SOUTH CONNECTION A & B
WITH OPTIONAL EXTENSION





LEGEND

EXISTING	PROPOSED	
- - - -	——	PATH
- - - -	——	SIDEWALK
—·—·—	—·—·—	RIGHT-OF-WAY

NOTES:

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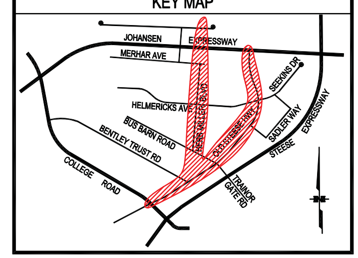

OLD STEESE HIGHWAY REALIGNMENT		
Design & Construction	$	8,433,780
Utility Work	$	3,253,000
Right-of-Way Acquision	$	11,322,900
Total	$	23,009,680

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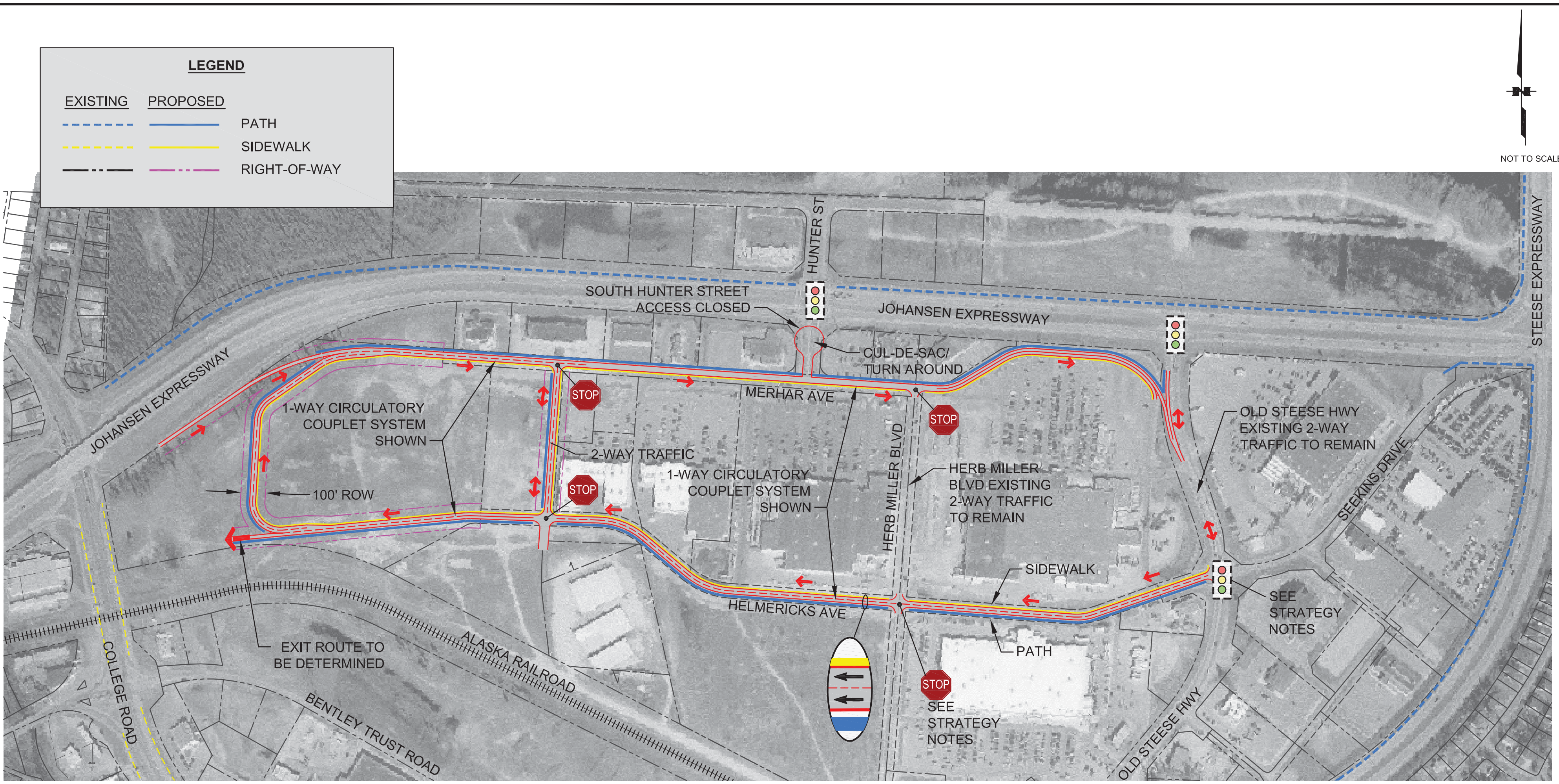
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 38
OLD STEESE HIGHWAY
REALIGNMENT



STRATEGY NOTES:

1. CIRCULATORY ROADWAY TRAFFIC IS FREE FLOWING
2. ROUNDABOUTS SHOULD BE CONSIDERED BUT NOT SHOWN FOR CLARITY

NOTES:

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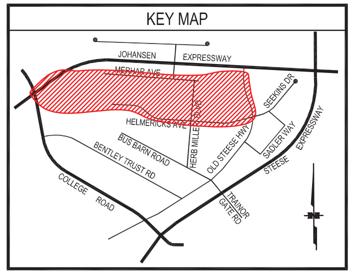
KEY MAP



CIRCULATORY ROADWAY SYSTEM		
Design & Construction	$	6,345,410
Utility Work	$	4,345,500
Right-of-Way Acquision	$	7,514,100
Total	$	18,205,010

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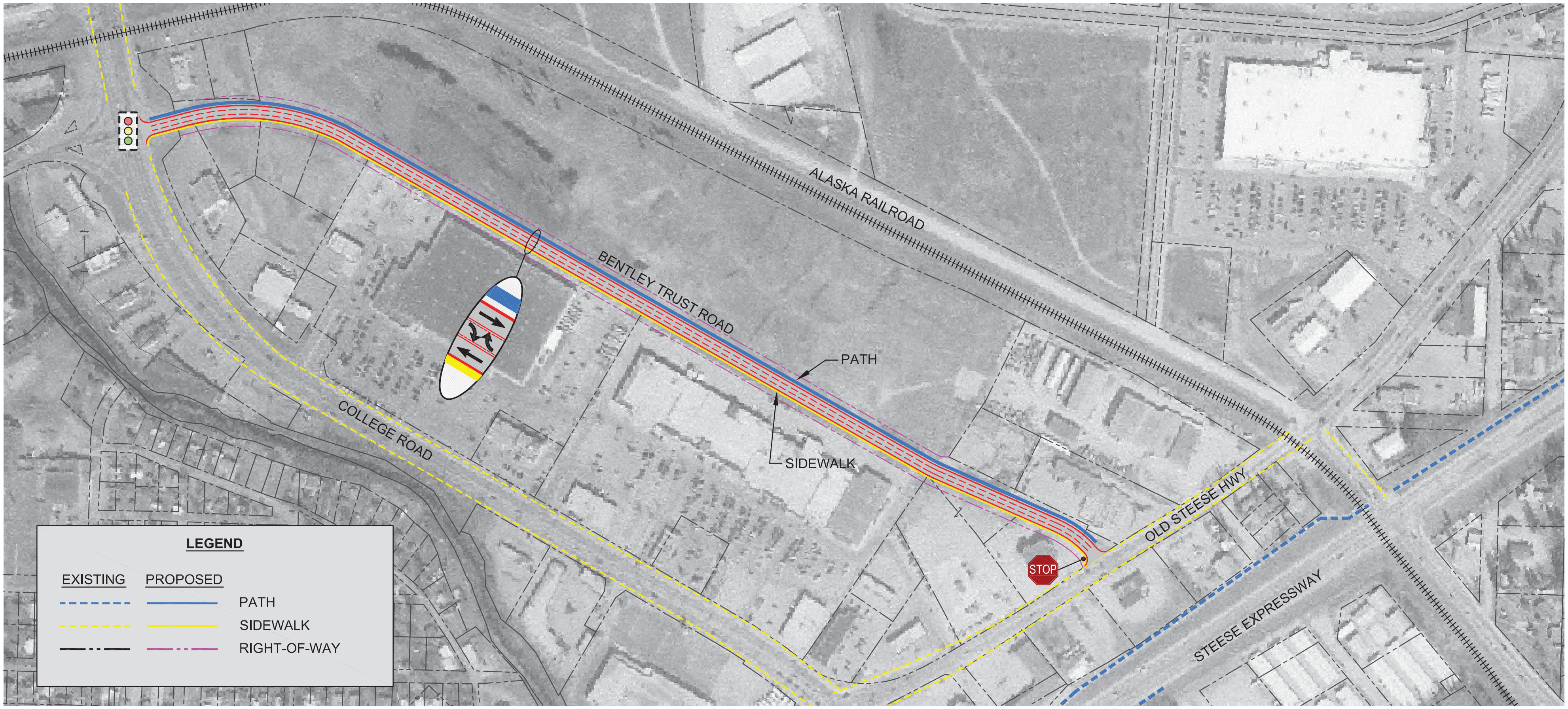
STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 39

CIRCULATORY ROAD SYSTEM

(SHOWN AS A ONE-WAY COUPLET SYSTEM)



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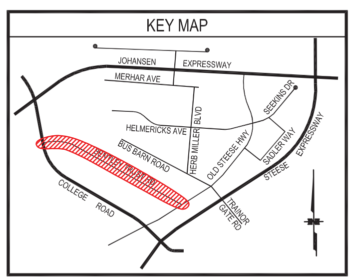
NOT TO SCALE



BENTLEY TRUST ROAD UPGRADE		
Design & Construction	$	3,007,570
Utility Work	$	1,584,100
Right-of-Way Acquision	$	6,450,120
Total	$	11,041,790

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STEESE HIGHWAY / JOHANSEN EXPRESSWAY AREA TRAFFIC IMPROVEMENTS

FIGURE 40

BENTLEY TRUST ROAD UPGRADE

5.5.3 Strategies Identified Through Public Involvement

Several strategies were suggested for evaluation by affected agencies, land owners, and the public through the public involvement process (further described in Section 5.7). Many of the strategies are variations on those described in the previous sections. However, strategies that were identified and not variations to existing strategies include:

- Interchange at Johansen Expressway and Hunter Street;
- Additional lanes on Old Steese Highway from Trainor Gate Road to Helmericks Avenue; and
- Old Steese Highway-Herb Miller Boulevard & Bus Barn Road one-way couplet.

- ***Interchange at Johansen Expressway and Hunter Street***

This strategy would construct an interchange at Hunter Avenue, including frontage roads on both sides of the Johansen Expressway between the Steese Expressway and College Road. Implementation of this strategy will require significant ROW acquisition, removing and/or relocating numerous business buildings adjacent to the Johansen Expressway, constructing two bridge structures, and installing two new traffic signals.

While this strategy improves the overall operation of the intersection, the impacts are significant. Alternatives exist that improve the level of service at this location without significant ROW impacts. As such, this strategy was not considered further.

- ***Additional lanes on Old Steese from Trainor Gate Road to Helmericks Avenue***

The two scenarios presented by this strategy include increasing the number of lanes on the Old Steese Highway from three to either four (two northbound and two southbound) or five (two northbound, two southbound, and one continuous-two-way-left-turn lane). The purpose of this strategy is to increase the capacity of the Old Steese Highway.

This strategy results in increased capacity, but will likely not result in an improved level of service. This is shown by examining the operational characteristics of the five-lane section of the Old Steese Highway between College Road and Trainor Gate Road which currently operates at LOS F (Figure 7) with lower traffic volumes (Figure 18). Additionally, it is anticipated to operate at LOS F in the future (Figure 24). As such, this strategy is not anticipated to improve the overall level of service, and consequently does not meet the goals of this study.

- ***Old Steese Highway-Herb Miller Boulevard & Bus Barn Road one-way couplet***

This strategy converts the Old Steese Highway to a northbound one-way road between Trainor Gate Road and Helmericks Avenue, converts Herb Miller Boulevard to a southbound one-way road between Helmericks Avenue and Bus Barn Road, and adds a new traffic signal at Old Steese Highway and Trainor Gate Road/Bus Barn Road.

This strategy relies heavily on using a portion of the Bus Barn Road. Since the ARRC has stated that Bus Barn Road will not be made available for public access and an alternative southbound route is not available, this strategy is not feasible. Additionally, the location of the proposed signal does not consider issues related with the close proximity of the existing Steese Expressway & Trainor Gate Road signal.

5.6 Mitigation Cost Estimates

Cost estimates were developed for each intersection and road network strategy. Utility and ROW costs are based on available mapping. A summary of strategy costs is presented in Table 5-3. Complete cost estimates are included as Appendix H.

Table 5-3 Summary of Mitigation Strategy Costs

Location	Design & Construction	Utility	ROW	Total Cost
Pedestrian and Bicycle Provisions				
Old Steese Highway Sidewalk and Pathway *Trainor Gate Road - Johansen Expressway*	$385,520	$447,500	$0	**$833,020**
Steese Expressway Pathway	$284,060	$0	$0	**$284,060**
Interim Intersection Strategies				
Johansen Expressway & Hunter Street	See note 1			
Johansen Expressway & Steese Expressway	$475,830	$60,000	$0	**$535,830**
College Road & Illinois/Bentley Trust Road	$155,140	$0	$0	**$155,140**
College Road & Old Steese Highway	$260,020	$893,000	$196,650	**$1,349,670**
College Road & Steese Expressway	$352,360	$354,000	$0	**$706,360**
Old Steese Highway & Helmericks Avenue	$281,960	$20,000	$0	**$301,960**
Long-Term Intersection Strategies				
Johansen Expressway & College Road *Roundabout Interchange*	$2,824,180	$643,500	$964,620	**$4,432,300**
Johansen Expressway & Steese Expressway *Roundabout*	$6,367,710	$304,000	$126,270	**$6,797,980**
Johansen Expressway & Steese Expressway *Continuous Flow Intersection*	$9,964,250	$320,400	$424,350	**$10,709,000**
Johansen Expressway & Steese Expressway *Roundabout Interchange*	$22,573,390	$306,500	$1,026,720	**$23,906,610**
Johansen Expressway & Steese Expressway *Eastbound Left-turn Flyover – Option A*	$9,263,210	$146,000	$0	**$9,409,210**
Johansen Expressway & Steese Expressway *Eastbound Left-turn Flyover – Option B*	$9,994,410	$220,000	$24,840	**$10,239,250**
Johansen Expressway & Steese Expressway *Directional Interchange*	$24,339,350	$306,500	$755,550	**$25,401,400**
College Road & Illinois/Bentley Trust Road *Roundabout*	$1,616,600	$558,500	$0	**$2,175,500**
College Road & Old Steese Hwy/Steese Exp. *Roundabouts*	$2,458,060	$1,433,000	$215,280	**$4,106,340**
Old Steese Highway & Helmericks Avenue *Roundabout*	$923,400	$179,500	$356,040	**$1,458,940**
Helmericks Avenue & Herb Miller Boulevard *Roundabout*	$1,157,400	$748,500	$565,110	**$2,471,010**
Road System Mitigation Strategies				
Helmericks Avenue Extension	$2,571,920	$841,500	$4,001,310	**$7,414,730**
Merhar Avenue Extension	$3,387,180	$1,117,750	$6,746,130	**$11,251,060**
North-South Connection A	$2,389,740	$308,750	$3,990,960	**$6,689,450**
North-South Connection A Extension	$1,337,380	$276,000	$1,126,080	**$2,739,460**
North-South Connection B	$2,034,390	$430,000	$3,049,110	**$5,513,500**
North-South Connection B Extension	$1,342,440	$875,750	$1,355,850	**$3,574,040**
Old Steese Highway Realignment	$8,433,780	$3,253,000	$11,322,900	**$23,009,680**
Circulatory Road System	$6,345,410	$4,345,500	$980,100	**$18,205,010**
Bentley Trust Road Upgrade	$3,007,570	$1,584,100	$6,450,120	**$11,041,790**

1. Strategy limited to pavement markings and signal timing adjustments. Costs are considered negligible

5.7 Public Involvement and Agency Participation

Development of the mitigation strategies considered input from local agencies, land owners, and the public at large. A summary of public involvement efforts is presented in Table 5-4. In addition to the meetings and presentations, a project web site was established (http://dot.alaska.gov/nreg/steese-johansen).

Table 5-4 Public Involvement and Agency Participation Summary

Date	Event Type	Represented
June 10, 2009	Working Meeting	Alaska DOT&PF, Northern Region (Traffic, Planning, & Highways Sections)
June 11, 2009	Presentation	Bentley Trust Working Group Fairbanks North Star Borough City of Fairbanks Alaska Rail Road J&J Development Alaska DOT&PF, Northern Region
November 4, 2009	Open House	General Public
November 5, 2009	Working Meeting	Fairbanks North Star Borough City of Fairbanks Fairbanks Metropolitan Area Transportation System Alaska DOT&PF, Northern Region
January 11, 2010	Work Session	Alaska DOT&PF, Northern Region City of Fairbanks

Public and agency comments received to date are included in Appendix I.

6.0 Findings and Conclusions

Analyses of the Bentley Trust area road network indicate that mitigation strategies are necessary to maintain acceptable levels of service on both roads and intersections. The mitigation strategies developed in Section 5 of this study address road, intersection, and pedestrian needs, and may be implemented individually or in combination with other strategies.

6.1 Recommendations

6.1.1 Considerations for Mitigation Strategy Implementation

The strategies advanced for consideration in Section 5 are all aimed at improving both vehicular and pedestrian traffic conditions in the Bentley Trust area. Prioritization of these strategies will depend on available funding, availability of ROW, utility impacts, and the environmental approval process. As mitigation strategies are advanced, the following are recommended:

- Determine which agencies have road maintenance powers and identify which agency will oversee and/or perform maintenance activities on proposed roads, intersections, and pedestrian/bicycle facilities. All applicable agreements and contracts should be negotiated and in place before a strategy is advanced.
- Prepare a phasing plan for implementing multiple strategies. This plan should consider locations already in a long range improvement plan.
- The first phase of the plan should implement a strategy (or strategies) that will improve conditions immediately upon construction and support future implementation of other strategies.
- Continue coordinating project development efforts with area stakeholders (land owners, agencies, the ARRC, utility companies, etc.).

6.1.2 Recommendations for Mitigation Strategy Implementation

This study developed numerous strategies that address the needs of the Bentley Trust area road network, including pedestrian and bicycle facilities. As stated previously, maintenance agreements need to be in place prior to a strategy being put into service. The DOT&PF may advance any of the strategies developed in this study based on identified area-wide needs, estimated costs, maintenance considerations, and schedule constraints. This section provides recommendations for DOT&PF's consideration based on the strategies developed in this study, public comments, and discussions with affected agencies.

- ***Interim Implementation***

As noted in Section 5.4, interim strategies address the immediate needs of intersections and individual turning movements currently operating below acceptable levels of service, and are intended to maintain the existing levels of service for a short time until a long-term strategy is implemented. These strategies provide very little benefit (Table 5-1) and should only be considered during reviews of traffic operations. Other strategies provide greater benefits and may ultimately render interim strategies ineffective.

Although interim strategies are not recommended, a project should be initiated as soon as possible that will address delay and congestion at the Steese Highway and Johansen Expressway intersection. At a minimum, this project should result in a Reconnaissance Engineering Study. The results and recommendations of the study should be incorporated into the long-range transportation plan.

- ***Near Term Implementation***

The strategies identified for implementation in the near term combine the distribution and collection strategies with intersection strategies, and will have an immediate effect on the traffic conditions. The following strategies may be considered for near term implementation:

1. Helmericks Avenue Extension (Figure 35). This strategy will affect traffic conditions immediately upon construction by providing an access point on the west side of the area, which is not currently in place, and by providing a continuous east-west corridor through the development area. Reduced traffic demands on portions of the Old Steese Highway, the Johansen Expressway, and related intersections may be expected through the redistribution of traffic volumes.
2. Helmericks Avenue & Herb Miller Boulevard Roundabout (Figure 34). This strategy will affect traffic operations at this location immediately upon construction by establishing traffic control for all legs of the intersection, and improving the safety of the intersection. Additionally, this strategy will support the implementation of the Helmericks Avenue Extension strategy and the Old Steese Realignment strategy.
3. Helmericks Avenue and Old Steese Highway Roundabout (Figure 33). This strategy will affect traffic operations at this location immediately upon construction by improving traffic flow through the intersection. This strategy will support the implementation of the Helmericks Avenue Extension strategy.
4. College Road & Illinois Street/Bentley Trust Road Roundabout (Figure 31). This strategy will affect traffic operations at this location immediately upon construction by improving traffic flow through the intersection. This strategy will support the implementation of the Helmericks Avenue Extension and Bentley Trust Road Upgrade strategies.

Of these strategies, the Helmericks Avenue Extension is expected to have the greatest potential for improving overall traffic conditions. The following two implementation sequences are equally beneficial, and may be considered as strategies are advanced:

- Sequence A – Construct the strategies in the following order: Helmericks Avenue Extension, Helmericks Avenue and Old Steese Highway Roundabout, Helmericks Avenue and Herb Miller Roundabout, and College Road & Illinois Street/Bentley Trust Road Roundabout. The goal of this sequence is to immediately relieve traffic pressure on the Old Steese Highway, Johansen Expressway, and associated intersections through the redistribution of traffic volumes. Once the Helmericks Avenue Extension is in place, intersection improvement strategies should be constructed shortly thereafter to maximize the safety and functionality of the newly established corridor.

- Sequence B - Construct the strategies in the following order: Helmericks Avenue and Old Steese Highway Roundabout, Helmericks Avenue and Herb Miller Roundabout, College Road & Illinois Street/Bentley Trust Road Roundabout, and Helmericks Avenue Extension. The goal of this sequence is to construct intersection improvements in anticipation of redistributed traffic volumes expected with the Helmericks Avenue Extension. Care should be taken in the design of roundabouts to ensure adequate levels of service are maintained as traffic patterns change. Also, adequate queue storage should be provided at each intersection.

The total estimated cost to implement these strategies ($13,519,780) is within anticipated available funding constraints.

Implementing the Helmericks Avenue Extension will be contingent on available ROW and an established maintenance plan in place. A developer in the project area has offered to work with DOT&PF to identify and donate ROW from their area holdings. Donated ROW will likely support existing development plans as well as the Helmericks Avenue Extension. Additionally, the ARRC has agreed to permit an additional at-grade crossing as long as maintenance is provided by an agency with road maintenance powers and all liability is assumed by a third party.

Since traffic patterns are expected to change as strategies are implemented, intersection queue lengths should be evaluated in successive design phases. Prior to implementing intersection mitigation strategies, determine traffic queue lengths for the nearest controlled intersections. The final design should provide for adequate queue storage at existing and proposed intersections, and ensure that operations of the proposed strategies are not adversely affected by anticipated queues.

Constructing pedestrian facilities on the Old Steese Highway may also be implemented in the near term. If advanced to construction, other near term strategies will need to be revisited to ensure adequate funding.

- ***Long Term Implementation***

The strategies identified for long-term implementation may be incorporated into existing long range plans or current improvement/upgrade projects. The DOT&PF may initiate these projects by completing critical tasks such as obtaining environmental approvals, ROW acquisition, and utility relocation in anticipation of future funding. The following are recommended for long term consideration:

1. Incorporate the Old Steese Highway Realignment into a long range transportation plan to acquire funding. (Figure 38)
2. Incorporate the Johansen Expressway & College Road Roundabout Interchange into a future Johansen Expressway improvement or upgrade project or construct it as an individual project.(Figure 25)
3. Incorporate the College Road & Steese Expressway/Old Steese Highway Roundabouts into a future Old Steese Highway improvement or upgrade project or construct them as an individual project. (Figure32)

- ***Ongoing Considerations***

As the area continues to develop and strategies are employed, the following should be considered:

- Require upgrades to Bentley Trust Road, currently a private roadway. Upgrades should be included in development plans as adjacent properties are developed or when implementing the Helmericks Avenue Extension strategy. Prior to allocating or funding projects on this privately owned road, ensure maintenance agreements are in place and legal public access has been granted.
- Changes to traffic circulation patterns may likely occur as mitigation strategies are put in place. If circulation problems persist, consider implementing those strategies that resolve circulation issues.

The results and recommendations of this study should be revisited at each phase of the implementation plan. As the strategies are put in place, traffic patterns are expected to change. These changes will vary at individual locations and should be considered in successive design phases.

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