TRAFFIC IMPACT STUDY

For

Founders Vista
Castle Rock, Colorado

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I. Introduction

Project Overview

This traffic impact study addresses the capacity, geometric, and control requirements associated with the development entitled Founders Vista.

This traffic impact study has been revised to address Town review comments dated 11/23/2022 regarding additional analysis of the N Ridge Road intersection with King Soopers Access and updates pursuant to the latest proposed site plan.

This proposed residential development consists of mix of single-family detached homes, and multi-family duplex homes. The development is located to the southwest of the intersection of Fifth Street (State Highway 86) and N Ridge Road in Castle Rock, Colorado.

Study Area Boundaries

The study area to be examined in this analysis encompasses the N Ridge Road intersections with Fifth Street, King Soopers Access, Enderud Boulevard, and Plum Creek Parkway, the intersection of Plum Creek Parkway with Gilbert Street, and proposed site accesses.

Figure 1 illustrates location of the site and study intersections.

Site Description

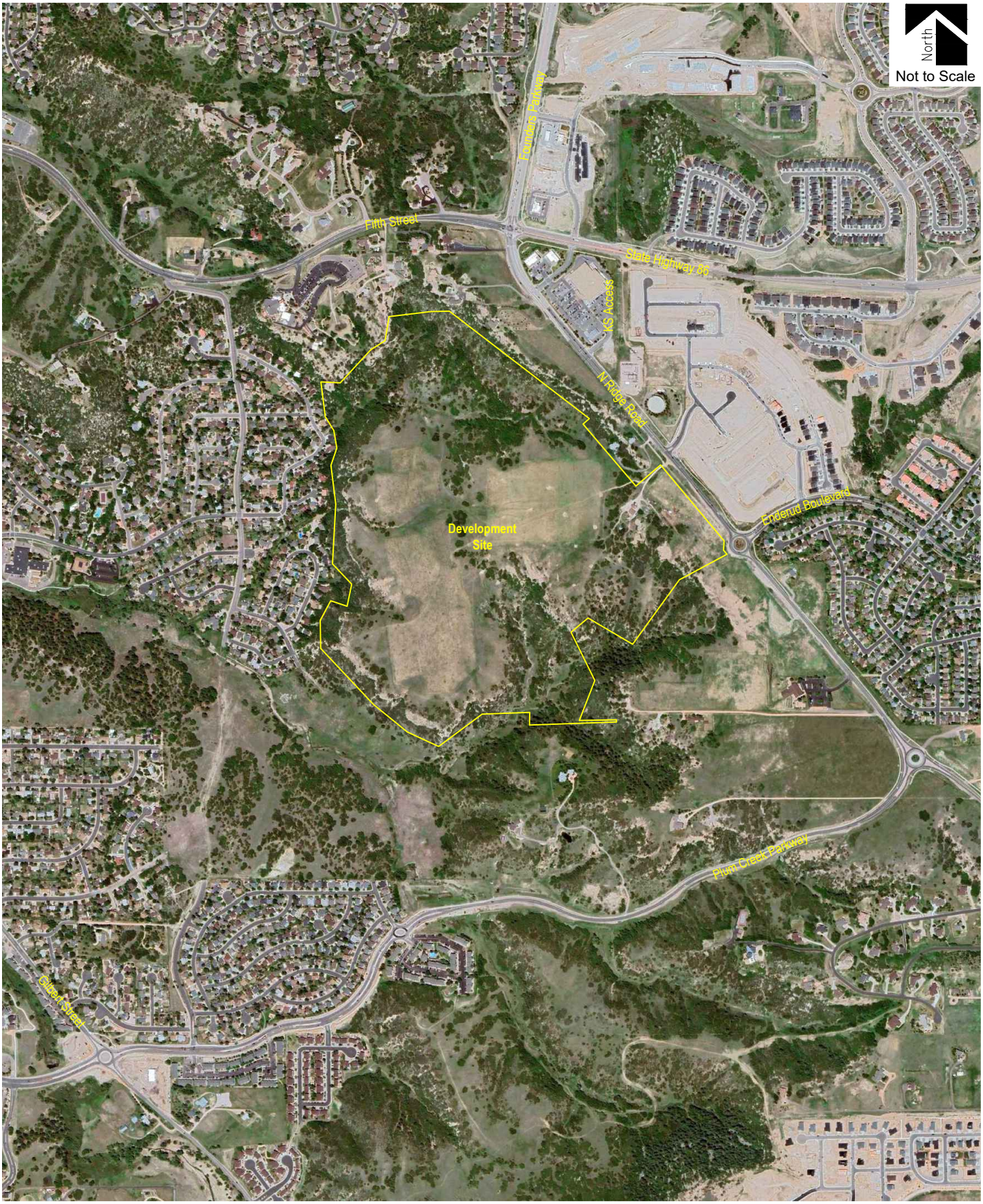
The proposed development is understood to entail the new construction of approximately 340 single-family detached housing units, and 224 duplex attached housing units.

Land for the development is currently vacant and surrounded by a mix of residential, commercial, and open space land uses.

Proposed access to the development is provided at the following locations: one full-movement access connecting to the roundabout at N Ridge Road and Enderud Boulevard (referred to as Access A), and one three-quarter access onto N Ridge Road north of Enderud Boulevard (referred to as Access B).

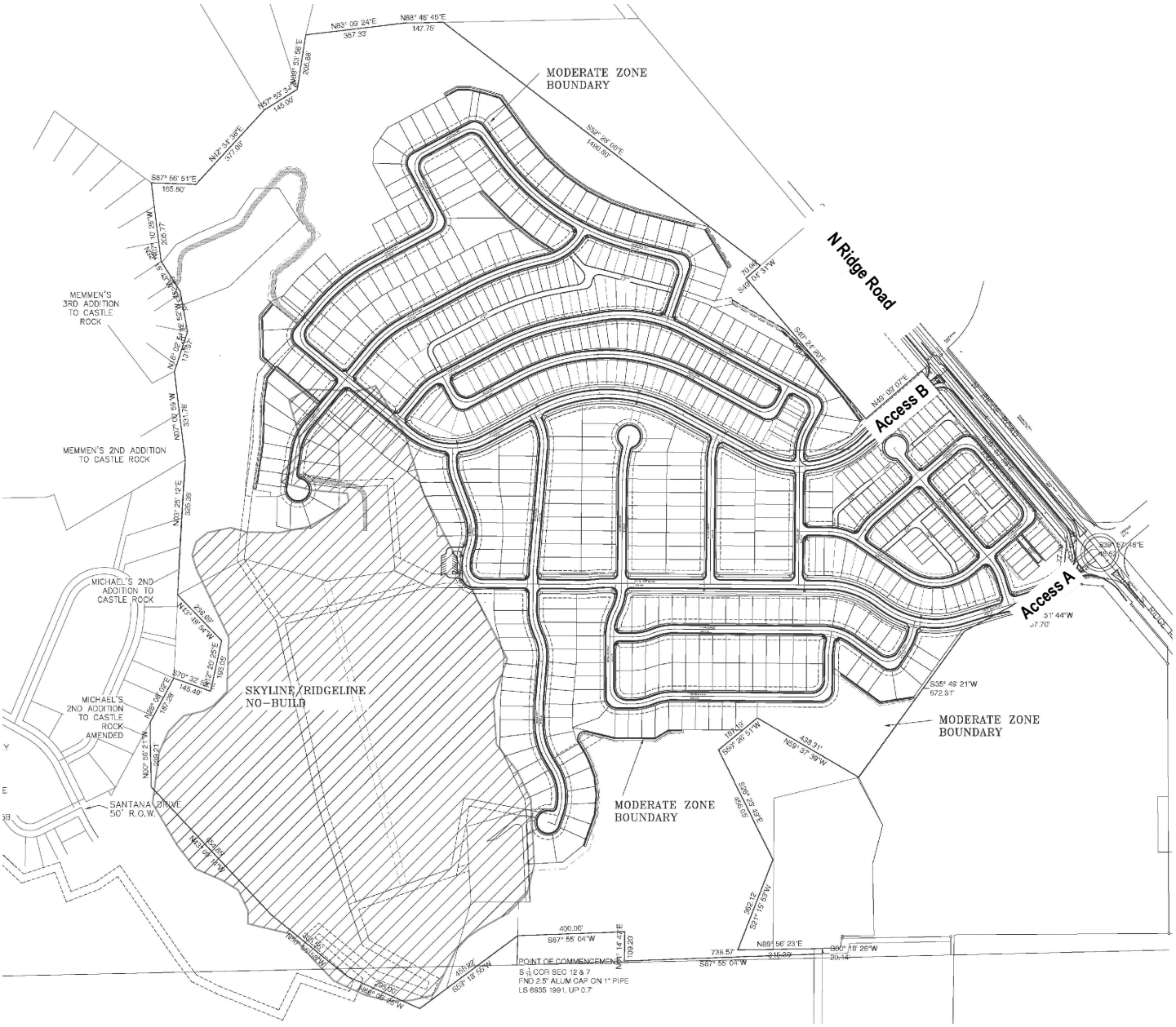
For purposes of this study, it is anticipated that development construction would be phased. However, specific phasing details are not known at this time. Therefore, it is assumed that development built-out would be completed by end of Year 2024.

A conceptual site plan, as prepared by Highline Engineering & Surveying, is shown on Figure 2. This plan is provided for illustrative purposes.


North
Not to Scale
Fifth Street
Founders Parkway
State Highway 86
KS Access
N Ridge Road
Development Site
Enderud Boulevard
Plum Creek Parkway
Quail Street

North

Not to Scale



Existing and Committed Surface Transportation Network

Within the study area, N Ridge Road is the primary roadway that will accommodate traffic to and from the proposed development. The secondary roadways include Fifth Street, Enderud Boulevard, Plum Creek Parkway, and Gilbert Street. A brief description of each roadway is provided below:

N Ridge Road is a north-south arterial roadway having two through lanes (one lane in each direction) with turn lanes at the intersections within the study area. N Ridge Road provides a posted speed limit of 45 MPH. It is noted that N Ridge Road becomes Founders Parkway north of Fifth Street. For ease of analysis Founders Parkway is not directly referenced and occurrences of N Ridge Road are generalized to refer to both the northern and southern legs of the intersection. It is also noted that Founders Parkway is a continuation of State Highway 86 north of Fifth Street. The Colorado Department of Transportation (CDOT) categorizes this segment of State Highway 86-B as a Regional Highway (R-A) and provides a posted speed limit of 50 MPH.

Fifth Street is an east-west arterial roadway having two through lanes (one lane in each direction) with exclusive turn lanes at the intersection within the study area. Fifth Street provides a posted speed limit of 45 MPH. It is noted that Fifth Street becomes State Highway 86-A east of N Ridge Road. For ease of analysis State Highway 86-A is not directly referenced and occurrences of Fifth Street are generalized to refer to both the eastern and western legs of the intersection. The Colorado Department of Transportation (CDOT) categorizes State Highway 86 as a Non-Rural Principal Highway (NR-A) and provides a posted speed limit of 55 MPH.

Enderud Boulevard is an east-west collector roadway having four through lanes (two lanes in each direction) with exclusive turn lanes at the intersection within the study area. Enderud Boulevard provides a posted speed limit of 35 MPH.

Plum Creek Parkway is an east-west arterial roadway having two through lanes (one lane in each direction) west of the intersection with N Ridge Road and four through lanes (two lanes in each direction) west of Eaton Street, with a combination of shared and exclusive turn lanes at the study intersections. Plum Creek Parkway provides a posted speed limit of 35 MPH.

Gilbert Street is a north-south arterial roadway having two through lanes (one lane in each direction) with a combination of shared and exclusive turn lanes at the study intersection. The posted speed limit on Gilbert Street is 35 MPH. It is noted that Gilbert Street becomes Lake Gulch Road south of Plum Creek Parkway. For ease of analysis Lake Gulch Road is not directly referenced and occurrences of Gilbert Street are generalized to refer to both the northern and southern legs of the intersection.

King Soopers Access is a north-south private local roadway having two through lanes (one lane in each direction) with exclusive turn lanes at the study intersection. King Soopers Access does not provide a posted speed limit. However, pursuant to its classification it is assumed to provide a speed limit of 25 MPH.

The study intersections of N Ridge Road with Fifth Street and King Soopers Access are signalized. The study intersections of N Ridge Road with Enderud Boulevard and Plum Creek Parkway, as well as Plum Creek Parkway with Gilbert Street operate as roundabouts. All other study intersections operate under a stop-controlled condition. A stop-controlled intersection is defined as a roadway intersection where vehicle rights-of-way are controlled by one or more "STOP" signs.

Pursuant to Town's transportation plan[1], N Ridge Road will be widened from two to four through lanes between Fifth Street and Plum Creek Parkway. Pursuant to Town review comments, this improvement is anticipated to be completed by end of Year 2024. It is also anticipated that Fifth Street would be widened at its intersection with N Ridge Road to allow for four through lanes, and northbound and southbound left turning movements at the study intersection would be accommodated by dual left turn lanes by Year 2024.

It is also noted that, pursuant to the Town's transportation plan, Plum Creek Parkway is anticipated to be widened from two to four through lanes between Eaton Street and N Ridge Road. However, the transportation plan does not identify when this improvement may occur. Therefore, for analysis purposes, it is assumed to be completed by Year 2040.

Additional planned regional improvements pursuant to Town Staff include the potential conversion of the signalized intersection at N Ridge Road with Fifth Street into a roundabout. It is anticipated that this improvement would likely occur by Year 2024. It is however noted that specific details regarding the roundabout design and geometries are presently being determined and may be subject to change. As such, geometries used within this study can only be assumed. It is therefore assumed to likely be a two-lane roundabout with eastbound and westbound right turn bypass lanes. Analysis of this improvement in relation to the proposed development is considered as an additional analysis to this study in Section VII. This is to provide for a comparison between the potential of continued signalization and the proposed roundabout conversion. All other study area roadways appear to be built to their ultimate cross-sections.

[1] Transportation Master Plan, Town of Castle Rock, October 2017.

II. Existing Traffic Conditions

Morning (AM) and afternoon (PM) peak hour traffic counts were collected at the intersections of N Ridge Road with Fifth Street, King Soopers (KS) Access, Enderud Boulevard and Plum Creek Parkway. Average daily (24-hour) traffic volumes were collected on N Ridge Road. Traffic counts for the intersection of Plum Creek Parkway and Gilbert Street, as well as average daily volumes for Plum Creek Parkway were obtained from a previously performed study entitled Plum Creek & Lake Gulch Traffic Impact Study[2].

Count data along N Ridge Road, with the exception of the KS Access intersection, was previously collected in Year 2020. Additionally, data referenced from the Plum Creek & Lake Gulch study was collected in Year 2018. In order to better represent existing Year 2022 traffic volumes, data for the KS Access intersection was compared to previously collected volumes within the study area and an average annual growth rate of approximately ten percent was applied. Newly collected and referenced counts representing existing traffic volumes are shown on Figure 3.

Traffic count data is included for reference in Appendix A.

Existing signal timing parameters for the intersections of N Ridge Road with Fifth Street and King Soopers Access were assumed based on existing signal head configurations and were used throughout this study to the best extent possible in order to remain consistent with typical signal coordination plans.

[2] Plum Creek & Lake Gulch: Traffic Impact Study, SM Rocha, LLC, September 2019.

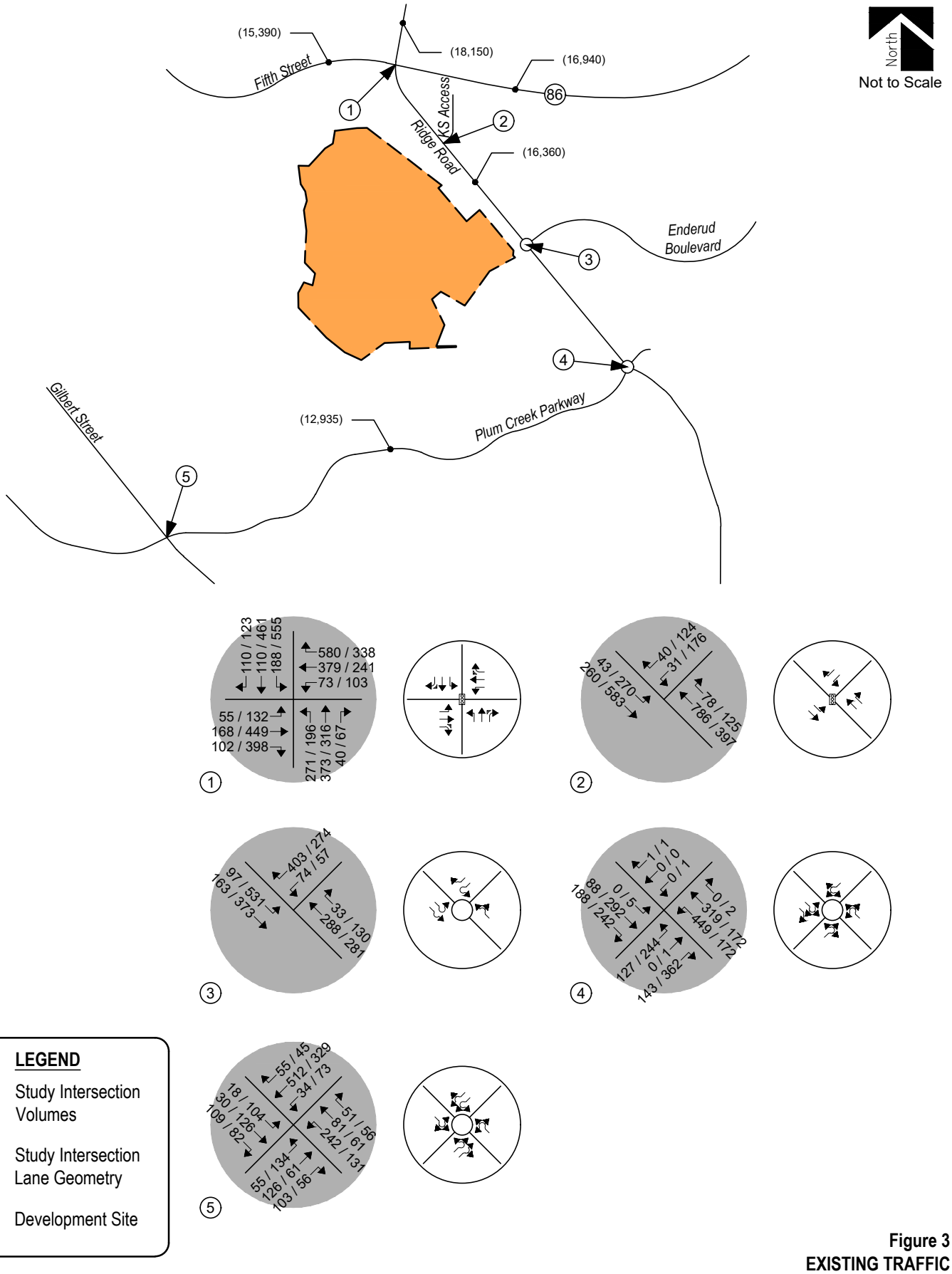


Figure 3
EXISTING TRAFFIC
Volumes & Intersection Geometry
AM / PM Peak Hour
(ADT) : Average Daily Traffic

The Signalized, Unsignalized and Roundabout Intersection Analysis techniques, as published in the Highway Capacity Manual (HCM) by the Transportation Research Board and as incorporated into the SYNCHRO computer program, were used to analyze the study intersections for existing traffic conditions. These nationally accepted techniques allow for the determination of intersection level of service (LOS) based on the congestion and delay of each traffic movement or the volume to capacity ratio and control delay for each approach where applicable.

Level of service is a method of measurement used by transportation professionals to quantify a driver's perception of travel conditions that include travel time, number of stops, and total amount of stopped delay experienced on a roadway network. The HCM categorizes level of service into a range from "A" which indicates little, if any, vehicle delay, to "F" which indicates a level of operation considered unacceptable to most drivers. These levels of service grades with brief descriptions of the operating condition, for unsignalized and signalized intersections, are included for reference in Appendix B and have been used throughout this study.

The level of service analyses results for existing conditions are summarized in Table 1.

Intersection capacity worksheets developed for this study are provided in Appendix C.

Table 1 – Intersection Capacity Analysis Summary – Existing Traffic

INTERSECTION LANE GROUPS	LEVEL OF SERVICE AM PEAK HOUR	 PM PEAK HOUR
N Ridge Road / Fifth Street (Signalized)	B (19.3)	D (38.4)
N Ridge Road / King Soopers Access (Signalized)	A (7.7)	B (12.7)
N Ridge Road / Enderud Boulevard (Roundabout)		
Westbound Left	A	A
Westbound Right	A	A
Northbound Through and Right	A	B
Southbound Left	A	A
Southbound Through	A	A
N Ridge Road / Plum Creek Parkway (Roundabout)		
Eastbound Left, Through and Right	A	B
Westbound Left, Through and Right	A	A
Northbound Left, Through and Right	B	A
Southbound Left and Through	A	A
Southbound Right	A	A
Plum Creek Parkway / Gilbert Street (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Through and Right	A	A
Westbound Left and Through	A	A
Westbound Through and Right	A	A
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	A

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)
Roundabout Intersection: Level of Service

Existing Traffic Analysis Results

Under existing conditions, operational analysis shows that the signalized intersection of N Ridge Road with Fifth Street has overall operations at LOS B during the morning peak traffic hour and LOS D during the afternoon peak traffic hour.

The signalized intersection of N Ridge Road with King Soopers Access has overall operations at LOS A during the morning peak traffic hour and LOS B during the afternoon peak traffic hour.

The roundabout intersection of N Ridge Road with Enderud Boulevard has turn movement operations at LOS A during the morning peak traffic hour and LOS B or better during the afternoon peak traffic hour.

The roundabout intersection of N Ridge Road with Plum Creek Parkway has turn movement operations at LOS B or better during both the morning and afternoon peak traffic hours.

The roundabout intersection of Plum Creek Parkway with Gilbert Street has turn movement operations at LOS A during both the morning and afternoon peak traffic hours.

III. Future Traffic Conditions Without Proposed Development

Background traffic is the traffic projected to be on area roadways without consideration of the proposed development. Background traffic includes traffic generated by development of vacant parcels in the area.

To account for projected increases in background traffic for Year 2024, a compounded annual growth rate of approximately two percent was applied to existing traffic volumes. This annual growth rate is consistent with regional growth projections and the level of in-fill development expected within the area.

Pursuant to the anticipated and proposed area roadway improvements discussed in Section I, Year 2024 background traffic conditions assume no additional roadway improvements to accommodate regional transportation demands beyond those previously described. Year 2040 assumes signal timing parameters for the N Ridge Road intersection of Fifth Street and King Soopers Access with optimized intersection splits in effort to better long-term intersection performance. This assumption provides for a conservative analysis. Roundabout analysis for N Ridge Road and Fifth Street for both Year 2024 and Year 2040 background traffic conditions is considered as an additional analysis in Section VII.

Projected background traffic volumes and intersection geometry for Years 2024 and 2040 are shown on Figure 4 and Figure 5, respectively.

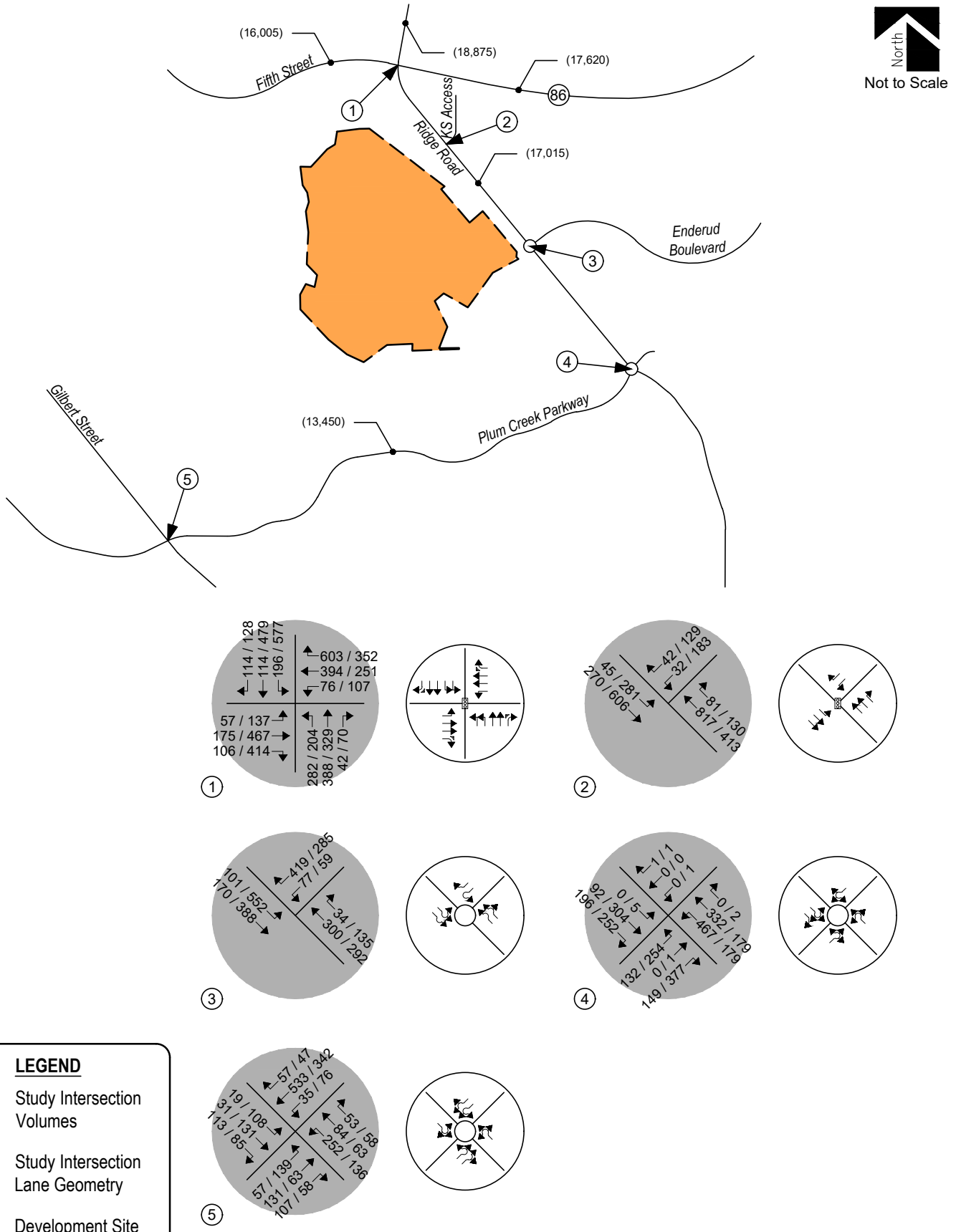


Figure 4
BACKGROUND TRAFFIC - YEAR 2024
Volumes & Intersection Geometry
AM / PM Peak Hour
(ADT) : Average Daily Traffic

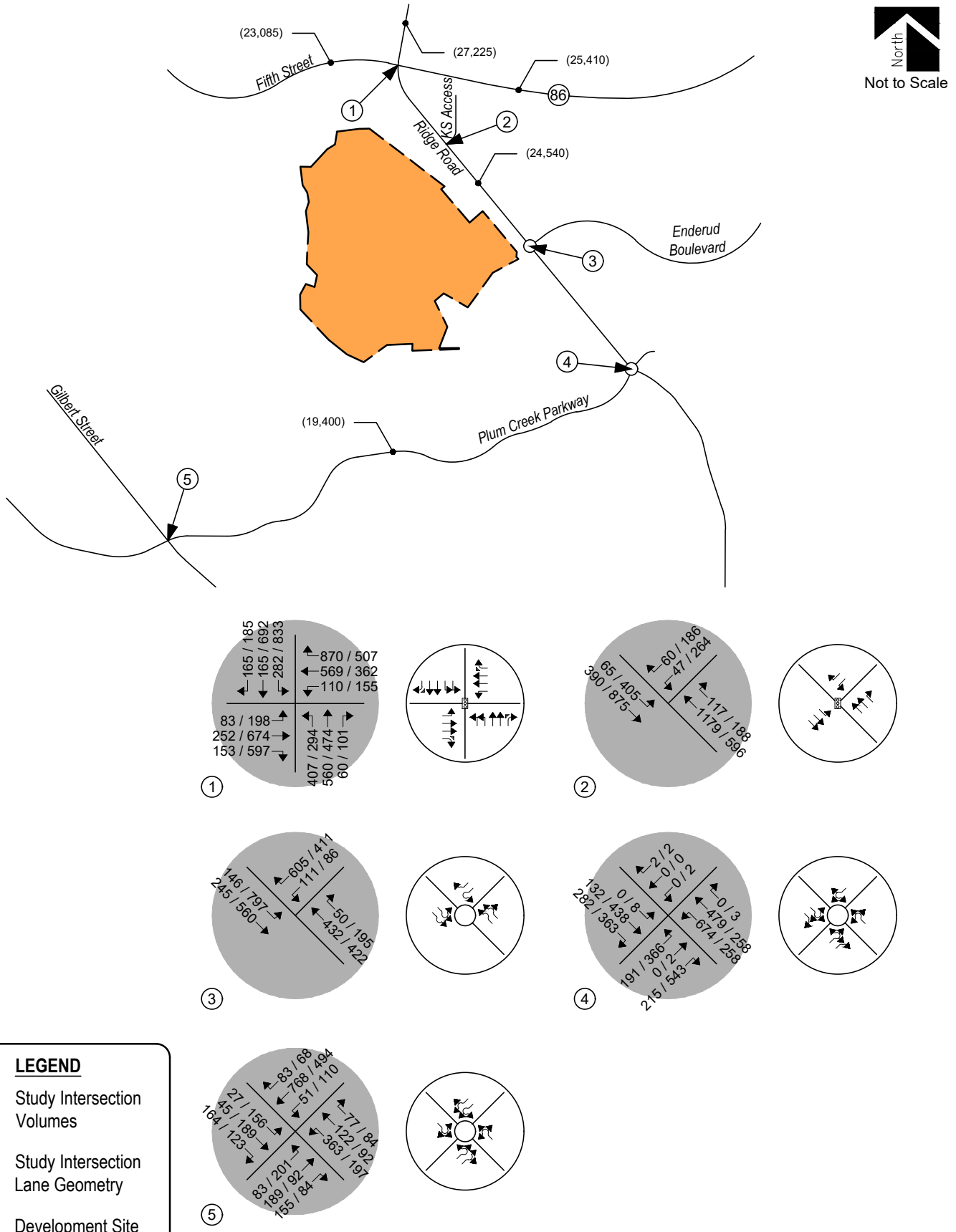


Figure 5
BACKGROUND TRAFFIC - YEAR 2040
Volumes & Intersection Geometry
AM / PM Peak Hour
(ADT) : Average Daily Traffic

As with existing traffic conditions, the operation of study intersections was analyzed under background conditions, without the proposed development, using the SYNCHRO computer program.

Background traffic level of service analyses results for Year 2024 are listed in Table 2. Year 2040 operational results are summarized in Table 3.

Definitions of levels of service are given in Appendix B. Intersection capacity worksheets are provided in Appendix C.

Table 2 – Intersection Capacity Analysis Summary – Background Traffic – Year 2024

INTERSECTION LANE GROUPS	LEVEL OF SERVICE AM PEAK HOUR	 PM PEAK HOUR
N Ridge Road / Fifth Street (Signalized)	B (16.2)	C (24.1)
N Ridge Road / King Soopers Access (Signalized)	A (5.7)	B (12.2)
N Ridge Road / Enderud Boulevard (Roundabout)		
Westbound Left	A	A
Westbound Right	A	A
Northbound Through and Right	A	A
Southbound Left	A	A
Southbound Through	A	A
N Ridge Road / Plum Creek Parkway (Roundabout)		
Eastbound Left, Through and Right	A	C
Westbound Left, Through and Right	A	A
Northbound Left, Through and Right	C	A
Southbound Left and Through	A	A
Southbound Right	A	A
Plum Creek Parkway / Gilbert Street (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Through and Right	A	A
Westbound Left and Through	A	A
Westbound Through and Right	A	A
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	A

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)
Roundabout Intersection: Level of Service

Background Traffic Analysis Results – Year 2024

Year 2024 background traffic analysis indicates that the signalized intersection of N Ridge Road with Fifth Street has overall operations at LOS B during the AM peak traffic hour and LOS C during the PM peak traffic hour.

The signalized intersection of N Ridge Road with King Soopers Access has overall operations at LOS A during the AM peak traffic hour and LOS B during the PM peak traffic hour.

Roundabout intersections within the study area have turning movement operations at LOS C or better during both AM and PM peak traffic periods.

Table 3 – Intersection Capacity Analysis Summary – Background Traffic – Year 2040

INTERSECTION LANE GROUPS	LEVEL OF SERVICE AM PEAK HOUR	 PM PEAK HOUR
N Ridge Road / Fifth Street (Signalized)	C (24.8)	D (35.9)
N Ridge Road / King Soopers Access (Signalized)	A (6.9)	B (18.9)
N Ridge Road / Enderud Boulevard (Roundabout)		
Westbound Left	A	A
Westbound Right	C	A
Northbound Through	A	C
Northbound Through and Right	A	B
Southbound Left and Through	A	B
Southbound Through	A	A
N Ridge Road / Plum Creek Parkway (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Right	A	C
Westbound Left, Through and Right	B	A
Northbound Left, Through and Right	F	B
Southbound Left and Through	A	A
Southbound Right	A	A
Plum Creek Parkway / Gilbert Street (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Through and Right	A	A
Westbound Left and Through	C	A
Westbound Through and Right	C	A
Northbound Left, Through and Right	B	A
Southbound Left, Through and Right	C	D

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)
Roundabout Intersection: Level of Service

Background Traffic Analysis Results – Year 2040

By Year 2040 and without the proposed development, the study intersection of N Ridge Road with Fifth Street experiences LOS C operations during the AM peak traffic hour and LOS D operations during the PM peak traffic hour.

The study intersection of N Ridge Road with King Soopers Access experiences LOS A operations during the AM peak traffic hour and LOS B operations during the PM peak traffic hour.

The study intersection of N Ridge Road with Enderud Boulevard experiences LOS C or better operations during both the AM and PM peak traffic hours.

The study intersection of N Ridge Road with Plum Creek Parkway experiences LOS B or better operations during the AM peak traffic hour and LOS C or better operations during the PM peak traffic hour. Exceptions would include the northbound turning movements which operate at LOS F during the AM peak traffic hour. The LOS F operation is attributed to high northbound right turning volumes and the roundabout nature of the intersection. Pursuant to ongoing and future development to the south of Plum Creek Parkway it is recommended that Town staff continue to monitor the study intersection in order to determine when mitigation measures are most appropriate. Long-term roadway improvements may include addition of a second roundabout lane to allow for an exclusive northbound right turn lane.

The study intersection of Plum Creek Parkway with Gilbert Street experiences LOS C or better operations during the AM peak traffic hour and LOS D or better during the PM peak traffic hour.

IV. Proposed Project Traffic

Trip Generation

Standard traffic generation characteristics compiled by the Institute of Transportation Engineers (ITE) in their report entitled Trip Generation, 11th Edition, were applied to the proposed land use in order to estimate average daily traffic (ADT), AM Peak Hour, and PM Peak Hour vehicle trips. A vehicle trip is defined as a one-way vehicle movement from a point of origin to a point of destination.

The ITE land use codes 210 (Single-Family Housing (Detached)) and 215 (Single-Family Housing (Attached)) were used for estimating trip generation because of their best fit to the proposed land use descriptions.

Trip generation rates used in this study are presented in Table 4.

Table 4 – Trip Generation Rates

ITE			TRIP GENERATION RATES						
			24	AM PEAK HOUR			PM PEAK HOUR		
CODE	LAND USE	UNIT	HOUR	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
210	Single-Family Housing (Detached)	DU	9.43	0.18	0.52	0.70	0.59	0.35	0.94
215	Single-Family Housing (Attached)	DU	7.20	0.15	0.33	0.48	0.32	0.25	0.57

Key: DU = Dwelling Units.
Note: All data and calculations above are subject to being rounded to nearest value.

Table 5 illustrates projected average daily traffic (ADT), AM Peak Hour, and PM Peak Hour traffic volumes likely generated by the proposed development upon build-out.

Table 5 – Trip Generation Summary

ITE			TOTAL TRIPS GENERATED						
			24	AM PEAK HOUR			PM PEAK HOUR		
CODE	LAND USE	SIZE	HOUR	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
210	Single-Family Housing (Detached)	340 DU	3,206	62	176	238	201	118	320
215	Single-Family Housing (Attached)	224 DU	1,613	33	74	108	73	55	128
		Total:	*4,819*	*95*	*250*	*346*	*274*	*173*	*447*

Note: All data and calculations above are subject to being rounded to nearest value.

Upon build-out, Table 5 illustrates that the proposed development has the potential to generate approximately 4,819 daily trips with 346 of those occurring during the morning peak hour and 447 during the afternoon peak hour.

Adjustments to Trip Generation Rates

A development of this type is not likely to attract trips from within area land uses nor pass-by or diverted link trips from the adjacent roadway system, therefore no trip reduction was taken in this analysis.

Trip Distribution

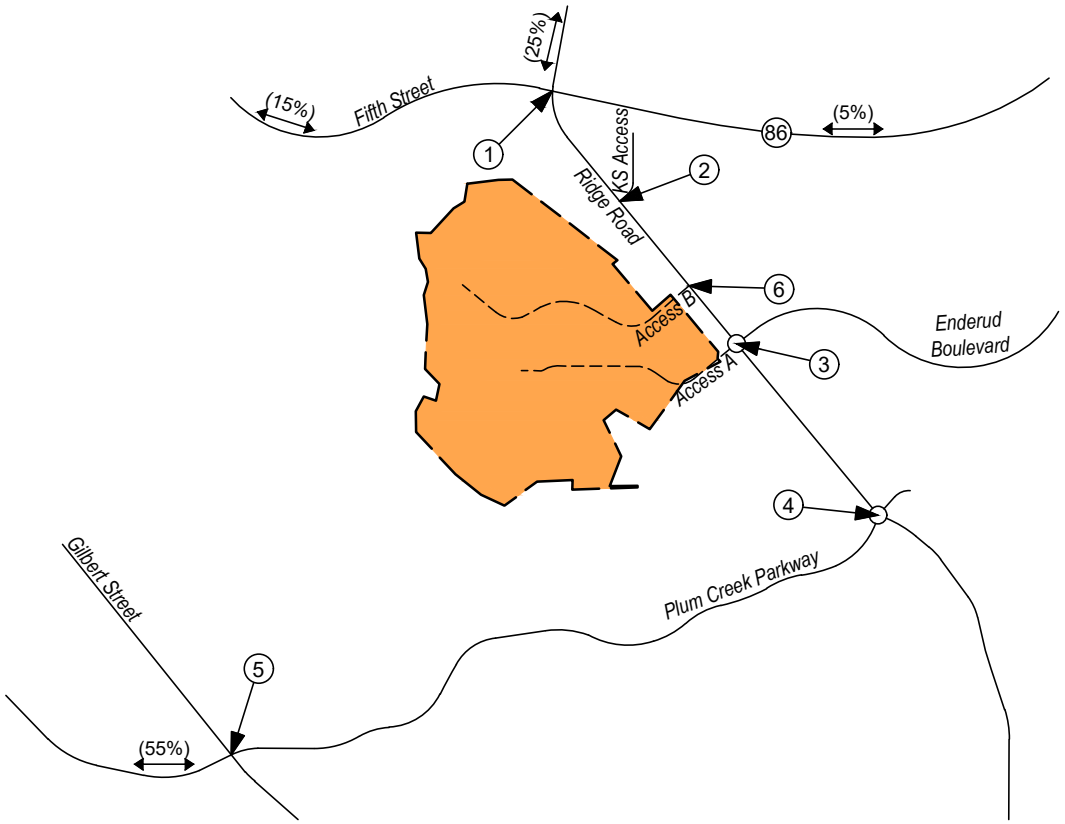
The overall directional distribution of site-generated traffic was determined based on the location of development site within the Town, proposed and existing area land uses, allowed turning movements, and available roadway network.

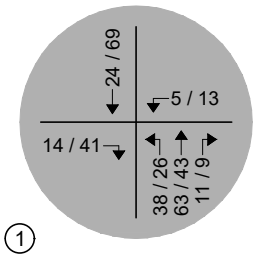
Overall trip distribution patterns for the development are shown on Figure 6.

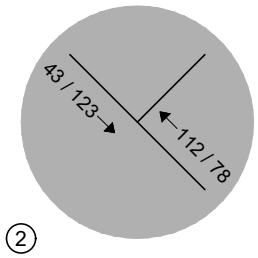
Trip Assignment

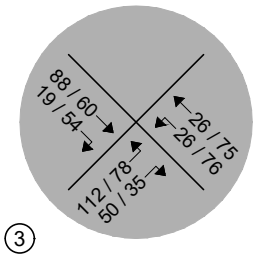
Traffic assignment is how generated and distributed vehicle trips are expected to be loaded onto the available roadway network.

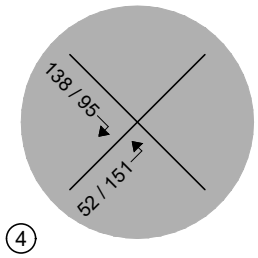
Applying trip distribution patterns to site-generated traffic provides the overall site-generated trip assignments shown on Figure 6.

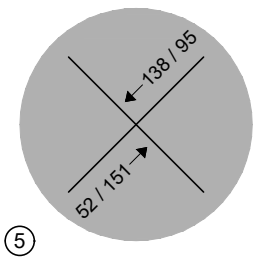


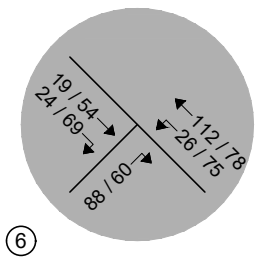












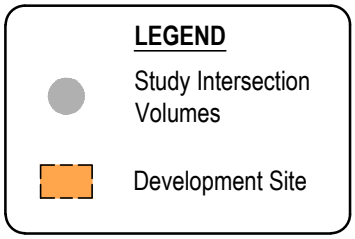


Figure 6
SITE DEVELOPMENT DISTRIBUTION
(%) : Overall
SITE-GENERATED
AM / PM Peak Hour

V. Future Traffic Conditions With Proposed Developments

Site-generated traffic was added to background traffic projections for Years 2024 and 2040 to develop total traffic projections. For analysis purposes, it was assumed that development construction would be completed by end of Year 2024.

Pursuant to area roadway improvement discussions provided in Section III, Year 2024 total traffic conditions assume no additional roadway improvements to accommodate regional transportation demands beyond those previously detailed. Year 2040 assumes optimized signal splits for the intersections of N Ridge Road with Fifth Street and King Soopers Access. Roadway improvements associated with site development are expected to be limited to site access and frontage as required by the governing agency. Roundabout analysis for the intersection of N Ridge Road and Fifth Street under total traffic conditions is considered as additional analysis in Section VII.

Projected Year 2024 total traffic volumes and intersection geometry are shown in Figure 7.

Figure 8 shows projected total traffic volumes and intersection geometry for Year 2040.

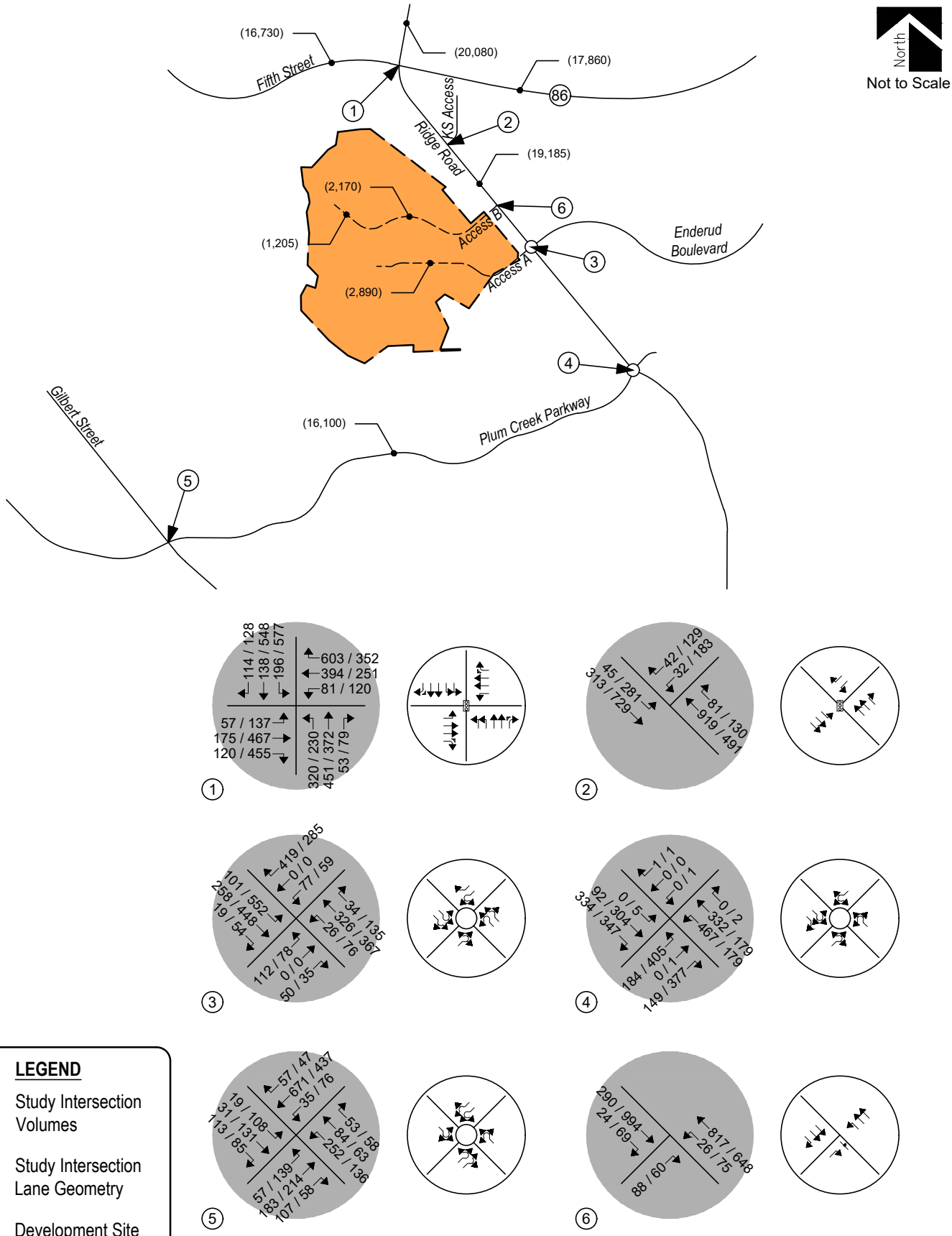
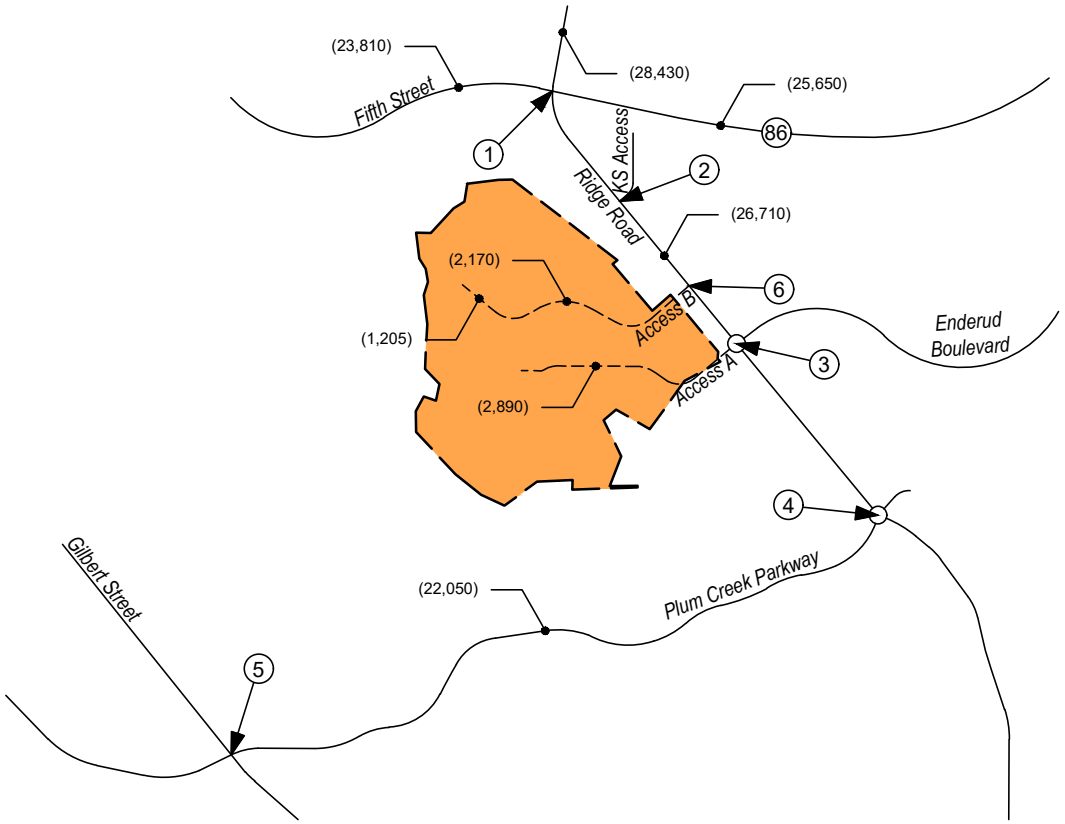


Figure 7
TOTAL TRAFFIC - YEAR 2024
Volumes & Intersection Geometry
AM / PM Peak Hour
(ADT) : Average Daily Traffic



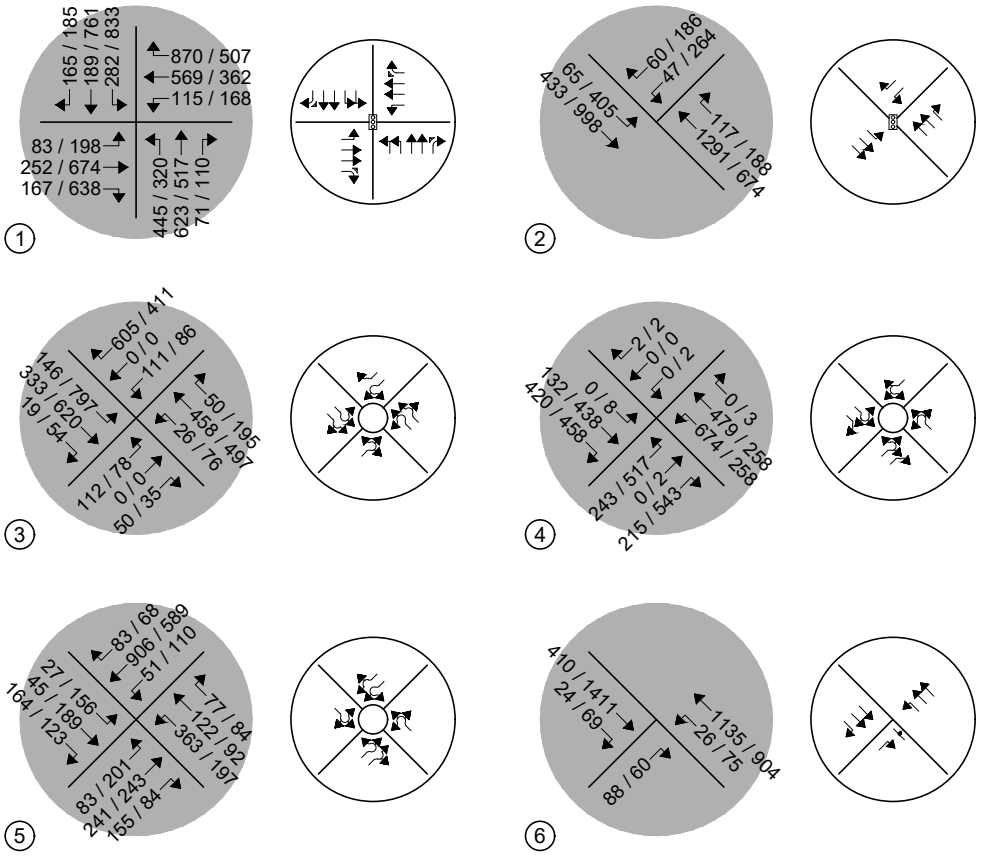


Figure 8
TOTAL TRAFFIC - YEAR 2040
Volumes & Intersection Geometry
AM / PM Peak Hour
(ADT) : Average Daily Traffic

VI. Project Impacts

The analyses and procedures described in this study were performed in accordance with the Highway Capacity Manual (HCM) and are based upon the worst-case conditions that occur during a typical weekday upon build-out of site development and analyzed land uses. Therefore, study intersections are likely to operate with traffic conditions better than those described within this study, which represent the peak hours of weekday operations only.

Peak Hour Intersection Levels of Service

As with background traffic, the operations of the study intersections were analyzed under projected total traffic conditions using the SYNCHRO computer program. Total traffic level of service analysis results for Years 2024 and 2040 are summarized in Table 6 and Table 7, respectively.

Definitions of levels of service are given in Appendix B. Intersection capacity worksheets are provided in Appendix C.

Table 6 – Intersection Capacity Analysis Summary – Total Traffic – Year 2024

INTERSECTION LANE GROUPS	LEVEL OF SERVICE AM PEAK HOUR	 PM PEAK HOUR
N Ridge Road / Fifth Street (Signalized)	B (16.2)	C (25.0)
N Ridge Road / King Soopers Access (Signalized)	A (5.8)	B (11.8)
N Ridge Road / Acces A / Enderud Boulevard (Roundabout)		
Eastbound Left, Through and Right	A	B
Westbound Left and Through	A	A
Westbound Right	B	A
Northbound Left and Through	A	B
Northbound Through and Right	A	B
Southbound Left and Through	A	A
Southbound Through and Right	A	A
N Ridge Road / Plum Creek Parkway (Roundabout)		
Eastbound Left, Through and Right	A	D
Westbound Left, Through and Right	A	A
Northbound Left, Through and Right	C	B
Southbound Left and Through	A	A
Southbound Right	A	A
Plum Creek Parkway / Gilbert Street (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Through and Right	A	A
Westbound Left and Through	A	A
Westbound Through and Right	A	A
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	B	B
N Ridge Road / Access B (Stop-Controlled)		
Eastbound Right	A	B
Northbound Left	A	A

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)
Roundabout Intersection: Level of Service
Stop-Controlled Intersection: Level of Service

Table 7 – Intersection Capacity Analysis Summary – Total Traffic – Year 2040

INTERSECTION LANE GROUPS	LEVEL OF SERVICE AM PEAK HOUR	 PM PEAK HOUR
N Ridge Road / Fifth Street (Signalized)	C (25.3)	D (36.6)
N Ridge Road / King Soopers Access (Signalized)	A (7.1)	B (19.7)
N Ridge Road / Acces A / Enderud Boulevard (Roundabout)		
Eastbound Left, Through and Right	A	C
Westbound Left and Through	A	A
Westbound Right	D	B
Northbound Left and Through	A	D
Northbound Through and Right	A	C
Southbound Left and Through	A	C
Southbound Through and Right	A	B
N Ridge Road / Plum Creek Parkway (Roundabout)		
Eastbound Left and Through	A	B
Eastbound Right	A	C
Westbound Left, Through and Right	B	A
Northbound Left, Through and Right	F	C
Southbound Left and Through	A	A
Southbound Right	A	A
Plum Creek Parkway / Gilbert Street (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Through and Right	A	A
Westbound Left and Through	C	B
Westbound Through and Right	C	B
Northbound Left, Through and Right	B	B
Southbound Left, Through and Right	D	E
N Ridge Road / Access B (Stop-Controlled)		
Eastbound Right	A	B
Northbound Left	A	B

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)
Roundabout Intersection: Level of Service
Stop-Controlled Intersection: Level of Service

Total Traffic Analysis Results Upon Development Build-Out

Table 7 illustrates how, by Year 2040 and upon development build-out, the signalized intersection of N Ridge Road with Fifth Street shows an overall LOS C operation during the morning peak traffic hour and LOS D operation during the afternoon peak traffic hour. Compared to the background traffic analysis, the traffic generated by the proposed development is not expected to significantly change the operations of the study intersection.

The signalized intersection of N Ridge Road with King Soopers Access shows an overall LOS A operation during the morning peak traffic hour and LOS B during the afternoon peak traffic hour.

The roundabout intersection of N Ridge Road with Enderud Boulevard and Access A is projected to have turning movement operations at LOS D or better for both the morning and afternoon peak traffic hours.

The roundabout intersection of N Ridge Road with Plum Creek Parkway is projected to have turning movement operations at LOS B or better during the morning peak traffic hour and LOS C or better during the afternoon peak traffic hour. Exceptions still include the northbound turning movements which operate at LOS F during the AM peak traffic hour. The LOS F operation is attributed to high northbound right turning volumes and the roundabout nature of the intersection. As previously noted in Section III, pursuant to ongoing and future development to the south of Plum Creek Parkway it is recommended that Town staff continue to monitor the study intersection in order to determine when mitigation measures are most appropriate. Long-term roadway improvements may include addition of a second roundabout lane to allow for an exclusive northbound right turn lane.

The roundabout intersection of Plum Creek Parkway with Gilbert Street is projected to have turning movement operations at LOS D or better for the morning peak traffic hour and LOS B or better during the afternoon peak traffic hour. Exceptions would include the southbound turning movements which operate at LOS E during the afternoon peak traffic hour. The LOS E operation anticipated is attributed to the high through volumes along Plum Creek Parkway and the roundabout nature of the intersection.

The stop-controlled intersection of N Ridge Road with Access B is projected to have turning movement operations at LOS A for the morning peak traffic hour and LOS B or better for the afternoon peak traffic hour.

Internal Roadway Classification

As shown on Figures 7 and 8, it is anticipated that the Access A and Access B site roadways will generally experience average daily traffic volumes greater than 2,000 trips. Pursuant to the Town *Transportation Design Criteria Manual*[3] (Code), Section 2, Table 2.2, the projected average daily traffic volumes indicate a roadway classification of Minor Residential Collector for both roadways. It is however noted that these volumes are likely to decrease further into the development site in correlation to a decreasing number of housing units which may utilize the adjacent roadway. Specifically, it is shown that the Access B site roadway is anticipated to support approximately 1,200 average daily traffic volumes along the end section. Pursuant to the Town Criteria this would allow for a Local Residential classification. Specific limits to roadway classifications and appropriate transitions between classifications are to be determined by the Developer in accordance with Town standards.

[3] Transportation Design Criteria Manual, Town of Castle Rock, December 2018.

VII. Additional Analysis

Additional analysis was conducted to consider the need for auxiliary lanes at site access locations, analysis of anticipated 95th percentile queue lengths, as well as the potential for the conversion of the signal at N Ridge Road and Fifth Street to a roundabout.

Queue Length Analysis

Queue lengths for proposed site access intersections with N Ridge Road were analyzed using Year 2040 total traffic conditions. The analysis yields estimate of 95th percentile queue lengths, which have only a five percent probability of being exceeded during the analysis time period. Queue lengths were modeled and are included with the Synchro worksheets in Appendix C.

No significant queues at the proposed site accesses were indicated. The greatest on-site queue length anticipated occurs at Access A during the afternoon peak hour. The queue length is approximately one vehicle for the eastbound left, through and right turn movement. Queue lengths at Access B are approximately one vehicle for the northbound left turning movement and the eastbound right turning movement.

Auxiliary Lane Analysis

Auxiliary lanes for site development accesses are to be based on the Town's Code.

Considering development build-out, an evaluation of auxiliary lane requirements, pursuant to Section 2.8.1, Table 2.6 of the Town's Code, access classification is considered in accordance with CDOT *State Highway Access Code* which reveals a classification of NR-B (Non-Rural Arterial) for N Ridge Road. Based on this criterion, the CDOT Code reveals that both a left turn and a right turn deceleration lane at Access B along N Ridge Road is required since the development's projected peak hour right turn and left turn ingress volumes exceed CDOT's thresholds of 25 and 10 vehicles per hour, respectively. Therefore, total traffic conditions were analyzed including right turn and left turn deceleration lanes at Access B.

Based on the posted speed limit of 45 MPH, the required deceleration lanes would need to provide a taper length of 162 feet plus a storage length long enough to accommodate 95th percentile queues. Given the queueing analysis provided this would result in a storage length of 25 feet. However, pursuant to Town standards, it is recommended that a minimum storage length of 100 feet be provided. This would result in deceleration lanes of 262 feet.

Roundabout Analysis - N Ridge Road & Fifth Street

Pursuant to conversation with Town Staff, the potential for a roundabout at the intersection of N Ridge Road with Fifth Street is to be considered and is to be based on Town's Code. As specific geometry for the proposed roundabout is not yet defined, it is understood through conversation that the roundabout is assumed to be at least two lanes with eastbound and westbound right turn bypass lanes. Roundabout geometry is assumed to be comparable to the existing roundabouts on N Ridge Road at Enderud Boulevard and Plum Creek Parkway.

Using both Year 2024 and Year 2040 background and total traffic conditions, SYNCHRO analysis was performed with the intersection of N Ridge Road and Fifth Street as a roundabout. Results from this analysis are provided in the tables below. Roundabout capacity worksheets are included in Appendix D for reference.

Table 8 – Roundabout Capacity Analysis Summary – Background Traffic – Year 2024

INTERSECTION	LEVEL OF SERVICE	
LANE GROUPS	AM PEAK HOUR	PM PEAK HOUR
N Ridge Road / Fifth Street (Roundabout)		
Eastbound Left and Through	A	E
Eastbound Through	A	D
Eastbound Right	A	A
Westbound Left and Through	B	A
Westbound Through	B	A
Westbound Right	A	A
Northbound Left and Through	A	E
Northbound Through and Right	A	D
Southbound Left and Through	B	D
Southbound Through and Right	A	D

Key: Roundabout Intersection: Level of Service

Year 2024 background traffic conditions indicate that a roundabout at the intersection of N Ridge Road and Fifth Street would operate at LOS B or better during the AM peak traffic hour and LOS D or better during the PM peak traffic hour. Exceptions would include the eastbound and northbound left and through movements which operate at LOS E during the PM peak traffic hour. The LOS E operations anticipated are attributed to the high eastbound and northbound left turning volumes.

Table 9 – Roundabout Capacity Analysis Summary – Background Traffic – Year 2040

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
Ridge Road / 5th Street (Roundabout)		
Eastbound Left and Through	A	F
Eastbound Through	A	F
Eastbound Right	A	A
Westbound Left and Through	D	C
Westbound Through	D	C
Westbound Right	A	A
Northbound Left and Through	C	F
Northbound Through and Right	C	F
Southbound Left and Through	D	F
Southbound Through and Right	D	F

Key: Roundabout Intersection: Level of Service

Year 2040 background traffic conditions indicate that the proposed roundabout would operate at LOS D or better during the AM peak traffic hour and LOS F or better during the PM peak traffic hour. The LOS F operations in the PM peak traffic period are primarily attributed to the high eastbound, northbound, and southbound left turning movements.

Table 10 – Roundabout Capacity Analysis Summary – Total Traffic – Year 2024

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
Ridge Road / 5th Street (Roundabout)		
Eastbound Left and Through	A	E
Eastbound Through	A	E
Eastbound Right	A	A
Westbound Left and Through	B	A
Westbound Through	B	A
Westbound Right	A	A
Northbound Left and Through	B	F
Northbound Through and Right	B	E
Southbound Left and Through	B	E
Southbound Through and Right	B	E

Key: Roundabout Intersection: Level of Service

Year 2024 total traffic conditions indicate that the proposed roundabout would operate at LOS B or better during the AM peak traffic hour and LOS E or better during the PM peak traffic hour. The LOS E operations in the PM peak traffic period are primarily attributed to the high eastbound, northbound, and southbound left turning movements.

Table 11 – Roundabout Capacity Analysis Summary – Total Traffic – Year 2040

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
Ridge Road / 5th Street (Roundabout)		
Eastbound Left and Through	A	F
Eastbound Through	A	F
Eastbound Right	A	A
Westbound Left and Through	E	C
Westbound Through	E	C
Westbound Right	A	A
Northbound Left and Through	D	F
Northbound Through and Right	D	F
Southbound Left and Through	E	F
Southbound Through and Right	D	F

Key: Roundabout Intersection: Level of Service

Year 2040 total traffic conditions indicate that the proposed roundabout would operate at LOS E or better during the AM peak traffic hour and LOS F or better during the PM peak traffic hour. The continued LOS E and F operations are primarily attributed to the eastbound, northbound, and southbound left turning movements. Compared to the background traffic analysis, the traffic generated by the proposed development is not expected to significantly change the operations of the study intersection.

Based upon these analysis results, a comparison with the signalized analysis previously performed indicates that the intersection of N Ridge Road with Fifth Street has better long-term operations as a continued signalized traffic control condition. This is primarily attributed to the benefit of providing dual left turn lanes under a signalized condition in order to accommodate high left turning volumes. It is noted that under either control condition, the proposed development causes no significant impact to intersection operations.

VIII. Conclusion

This traffic impact study addressed the capacity, geometric, and control requirements associated with the development entitled Founders Vista. This proposed residential development consists of mix of single-family detached homes, and multi-family duplex homes. The development is located to the southwest of the intersection of Fifth Street (State Highway 86) and N Ridge Road in Castle Rock, Colorado.

The study area examined in this analysis encompassed the N Ridge Road intersections with Fifth Street, King Soopers Access, Enderud Boulevard, and Plum Creek Parkway, the intersection of Plum Creek Parkway with Gilbert Street, and proposed site accesses.

Analysis was conducted for critical AM Peak Hour and PM Peak Hour traffic operations for existing traffic conditions, Year 2024 and Year 2040 background traffic conditions, and Year 2024 and Year 2040 total traffic conditions.

Under existing conditions, operational analysis shows that the signalized intersection of N Ridge Road with Fifth Street has overall operations at LOS B during the morning peak traffic hour and LOS D during the afternoon peak traffic hour. The signalized intersection of N Ridge Road with King Soopers Access has overall operations at LOS A during the morning peak traffic hour and LOS B during the afternoon peak traffic hour. The roundabout intersection of N Ridge Road with Enderud Boulevard has turn movement operations at LOS A during the morning peak traffic hour and LOS B or better during the afternoon peak traffic hour. The roundabout intersection of N Ridge Road with Plum Creek Parkway has turn movement operations at LOS B or better during both the morning and afternoon peak traffic hours. The roundabout intersection of Plum Creek Parkway with Gilbert Street has turn movement operations at LOS A during both the morning and afternoon peak traffic hours.

Year 2024 background traffic analysis indicates that the signalized intersection of N Ridge Road with Fifth Street has overall operations at LOS B during the AM peak traffic hour and LOS C during the PM peak traffic hour. The signalized intersection of N Ridge Road with King Soopers Access has overall operations at LOS A during the AM peak traffic hour and LOS B during the PM peak traffic hour. Roundabout intersections within the study area have turning movement operations at LOS C or better during both AM and PM peak traffic periods.

By Year 2040 and without the proposed development, the study intersection of N Ridge Road with Fifth Street experiences LOS C operations during the AM peak traffic hour and LOS D operations during the PM peak traffic hour. The study intersection of N Ridge Road with King Soopers Access experiences LOS A operations during the AM peak traffic hour and LOS B operations during the PM peak traffic hour. The study intersection of N Ridge Road with Enderud Boulevard experiences LOS C or better operations during both the AM and PM peak traffic hours. The study intersection of N Ridge Road with Plum Creek Parkway experiences LOS B or better operations during the AM peak traffic hour and LOS C or better operations during the PM peak traffic hour. Exceptions would include the northbound turning movements which operate at LOS F during the AM peak traffic hour. The LOS F operation is attributed to high northbound right turning volumes and the roundabout nature of the intersection. Pursuant to ongoing and future development to the south of Plum Creek Parkway it is recommended that Town staff continue to monitor the study intersection in order to determine when mitigation measures are most appropriate. Long-term roadway improvements may include addition of a second roundabout lane to allow for an exclusive northbound right turn lane. The study intersection of Plum Creek Parkway with Gilbert Street experiences LOS C or better operations during the AM peak traffic hour and LOS D or better during the PM peak traffic hour.

Analysis of future traffic conditions indicates that the addition of site-generated traffic is expected to create no negative impact to traffic operations for the existing and surrounding roadway system upon implementation of the various roadway and intersection control improvements assumed within this analysis. With all conservative assumptions defined in this analysis, the study intersections are projected to operate at future levels of service comparable to Year 2040 background traffic conditions. Proposed site accesses have long-term operations at LOS B or better during peak traffic periods and upon build-out.

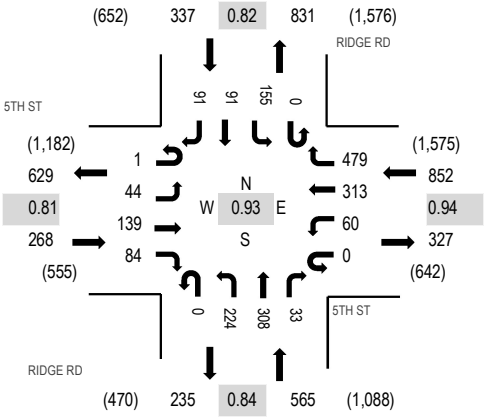
APPENDIX A

Traffic Count Data

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

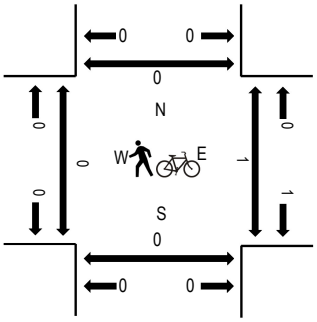
Location: 1 RIDGE RD & 5TH ST AM
Date: Wednesday, June 5, 2019
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



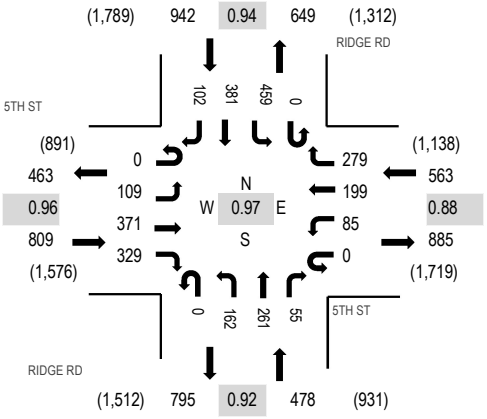
Traffic Counts

Interval Start Time	5TH ST Eastbound				5TH ST Westbound				RIDGE RD Northbound				RIDGE RD Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	11	34	13	0	11	57	116	0	52	87	5	0	29	15	21	451	1,941	0	0	0	0
7:15 AM	0	8	30	14	0	14	63	125	0	53	68	5	0	20	20	16	436	1,957	0	0	0	0
7:30 AM	1	9	37	21	0	14	88	123	0	49	75	7	0	46	24	19	513	2,022	0	0	0	0
7:45 AM	0	13	32	14	0	17	95	115	0	81	84	5	0	41	15	29	541	1,974	0	0	0	0
8:00 AM	0	10	28	25	0	11	57	128	0	47	83	11	0	29	22	16	467	1,929	0	0	0	0
8:15 AM	0	12	42	24	0	18	73	113	0	47	66	10	0	39	30	27	501		0	0	0	0
8:30 AM	0	19	40	20	0	16	63	83	0	52	78	9	0	43	22	20	465		0	0	0	0
8:45 AM	0	21	42	35	0	19	78	78	0	55	51	8	0	50	36	23	496		0	1	0	0
Count Total	1	103	285	166	0	120	574	881	0	436	592	60	0	297	184	171	3,870		0	1	0	0
Peak Hour	1	44	139	84	0	60	313	479	0	224	308	33	0	155	91	91	2,022		0	0	0	0

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

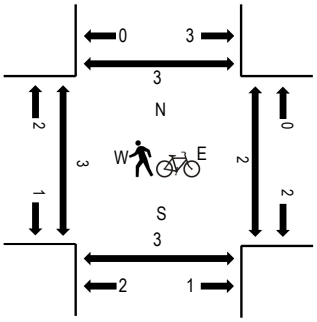
Location: 1 RIDGE RD & 5TH ST PM
Date: Wednesday, June 5, 2019
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



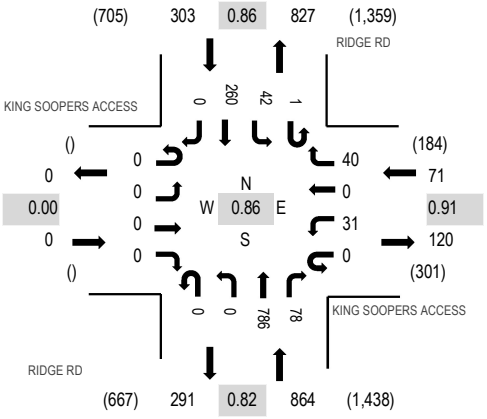
Traffic Counts

Interval Start Time	5TH ST Eastbound				5TH ST Westbound				RIDGE RD Northbound				RIDGE RD Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	26	80	73	0	17	50	74	0	33	55	9	0	105	80	19	621	2,643	0	0	0	0
4:15 PM	0	25	92	66	0	20	40	78	0	40	69	9	0	117	81	11	648	2,718	0	0	0	0
4:30 PM	0	26	89	80	0	21	57	88	0	30	67	6	0	115	94	16	689	2,791	0	0	0	0
4:45 PM	0	32	82	95	0	23	45	62	0	43	63	11	0	112	96	21	685	2,792	0	0	0	0
5:00 PM	0	31	91	69	0	16	48	74	0	39	74	16	0	116	95	27	696	2,791	0	2	0	3
5:15 PM	0	23	95	83	0	24	50	74	0	40	71	10	0	121	101	29	721		0	0	0	0
5:30 PM	0	23	103	82	0	22	56	69	0	40	53	18	0	110	89	25	690		2	0	2	0
5:45 PM	0	31	94	85	0	22	57	51	0	49	73	13	0	105	78	26	684		0	0	0	0
Count Total	0	217	726	633	0	165	403	570	0	314	525	92	0	901	714	174	5,434		2	2	2	3
Peak Hour	0	109	371	329	0	85	199	279	0	162	261	55	0	459	381	102	2,792		2	2	2	3

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

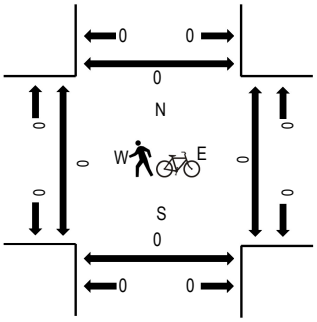
Location: 3 RIDGE RD & KING SOOPERS ACCESS AM
Date: Wednesday, March 30, 2022
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:15 AM - 07:30 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



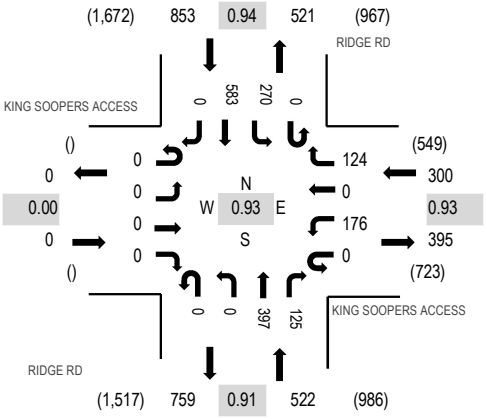
Traffic Counts

Interval Start Time	KING SOOPERS ACCESS Eastbound				KING SOOPERS ACCESS Westbound				RIDGE RD Northbound				RIDGE RD Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	0	0	0	0	7	0	9	0	0	197	18	0	5	46	0	282	1,238	0	0	0	0
7:15 AM	0	0	0	0	0	4	0	12	0	0	239	23	1	10	70	0	359	1,211	0	0	0	0
7:30 AM	0	0	0	0	0	8	0	9	0	0	206	17	0	16	79	0	335	1,144	0	0	0	0
7:45 AM	0	0	0	0	0	12	0	10	0	0	144	20	0	11	65	0	262	1,090	0	0	0	0
8:00 AM	0	0	0	0	0	17	0	10	0	0	113	24	0	19	72	0	255	1,089	0	0	0	0
8:15 AM	0	0	0	0	0	12	0	12	0	0	145	23	0	25	75	0	292		0	0	0	0
8:30 AM	0	0	0	0	0	17	0	14	0	0	133	23	0	28	66	0	281		0	0	0	0
8:45 AM	0	0	0	0	0	22	0	9	0	0	96	17	0	22	95	0	261		0	0	0	0
Count Total	0	0	0	0	0	99	0	85	0	0	1,273	165	1	136	568	0	2,327		0	0	0	0
Peak Hour	0	0	0	0	0	31	0	40	0	0	786	78	1	42	260	0	1,238		0	0	0	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

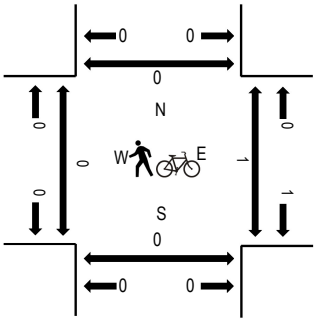
Location: 3 RIDGE RD & KING SOOPERS ACCESS PM
Date: Wednesday, March 30, 2022
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:00 PM - 04:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

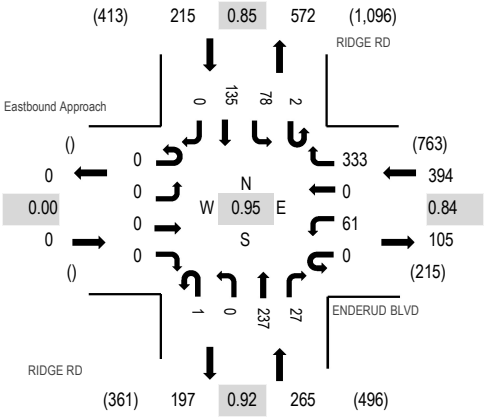
Interval Start Time	KING SOOPERS ACCESS Eastbound				KING SOOPERS ACCESS Westbound				RIDGE RD Northbound				RIDGE RD Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	0	0	0	0	46	0	35	0	0	106	37	0	65	161	0	450	1,675	0	0	0	0
4:15 PM	0	0	0	0	0	39	0	31	0	0	92	35	0	66	140	0	403	1,577	0	0	0	0
4:30 PM	0	0	0	0	0	45	0	30	0	0	102	23	0	73	138	0	411	1,573	0	0	0	0
4:45 PM	0	0	0	0	0	46	0	28	0	0	97	30	0	66	144	0	411	1,560	0	1	0	0
5:00 PM	0	0	0	0	0	30	0	20	0	0	87	20	0	57	138	0	352	1,532	0	0	0	0
5:15 PM	0	0	0	0	0	40	0	16	0	0	90	37	1	66	149	0	399		0	3	0	0
5:30 PM	0	0	0	0	0	52	0	22	0	0	98	25	0	56	145	0	398		0	0	0	0
5:45 PM	0	0	0	0	0	48	0	21	0	0	91	16	0	51	156	0	383		0	0	0	0
Count Total	0	0	0	0	0	346	0	203	0	0	763	223	1	500	1,171	0	3,207		0	4	0	0
Peak Hour	0	0	0	0	0	176	0	124	0	0	397	125	0	270	583	0	1,675		0	1	0	0

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

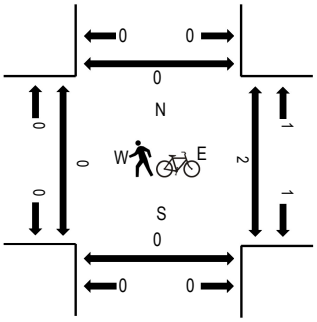
Location: 2 RIDGE RD & ENDERUD BLVD AM
Date: Wednesday, June 5, 2019
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



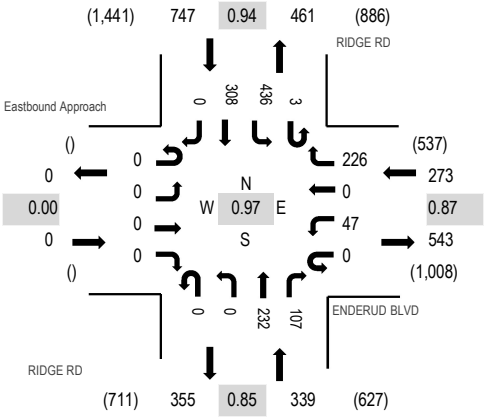
Traffic Counts

Interval Start Time	Eastbound Approach Eastbound				ENDERUD BLVD Westbound				RIDGE RD Northbound				RIDGE RD Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	0	0	0	0	8	0	86	0	0	66	6	0	14	17	0	197	816	0	0	0	0
7:15 AM	0	0	0	0	0	21	0	75	1	0	44	8	0	22	23	0	194	844	0	1	0	0
7:30 AM	0	0	0	0	0	6	0	93	0	0	45	3	0	20	28	0	195	861	0	0	0	0
7:45 AM	0	0	0	0	0	20	0	105	0	0	59	8	0	15	23	0	230	874	0	0	0	0
8:00 AM	0	0	0	0	0	15	0	86	1	0	66	5	0	22	30	0	225	856	0	1	0	0
8:15 AM	0	0	0	0	0	18	0	70	0	0	57	9	1	15	41	0	211		0	0	0	0
8:30 AM	0	0	0	0	0	8	0	72	0	0	55	5	1	26	41	0	208		0	1	0	0
8:45 AM	0	0	0	0	0	16	0	64	0	0	51	7	0	30	44	0	212		0	0	0	0
Count Total	0	0	0	0	0	112	0	651	2	0	443	51	2	164	247	0	1,672		0	3	0	0
Peak Hour	0	0	0	0	0	61	0	333	1	0	237	27	2	78	135	0	874		0	2	0	0

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

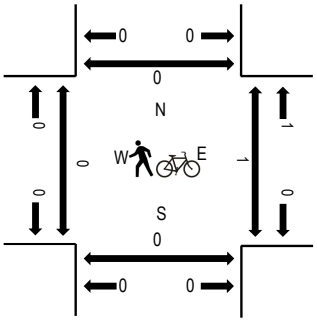
Location: 2 RIDGE RD & ENDERUD BLVD PM
Date: Wednesday, June 5, 2019
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

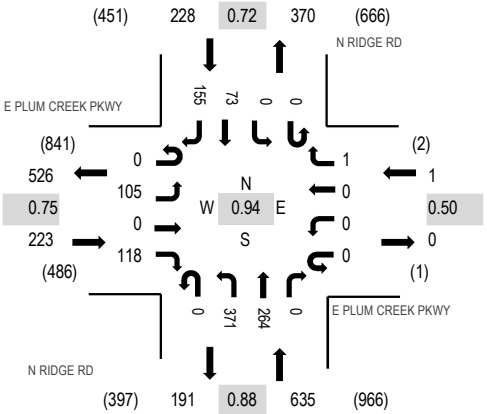
Interval Start Time	Eastbound Approach Eastbound				ENDERUD BLVD Westbound				RIDGE RD Northbound				RIDGE RD Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	0	0	0	0	11	0	52	0	0	50	23	1	95	71	0	303	1,272	0	0	0	0
4:15 PM	0	0	0	0	0	11	0	56	0	0	52	16	0	92	74	0	301	1,319	0	0	0	0
4:30 PM	0	0	0	0	0	13	0	50	0	0	51	26	0	97	81	0	318	1,338	0	0	0	0
4:45 PM	0	0	0	0	0	17	0	62	0	0	50	27	0	123	71	0	350	1,359	0	0	0	0
5:00 PM	0	0	0	0	0	12	0	50	0	0	65	35	2	108	78	0	350	1,333	0	0	0	0
5:15 PM	0	0	0	0	0	9	0	61	0	0	58	25	1	92	74	0	320		0	1	0	0
5:30 PM	0	0	0	0	0	9	0	53	0	0	59	20	0	113	85	0	339		0	0	0	0
5:45 PM	0	0	0	0	0	8	0	63	0	0	48	22	2	94	87	0	324		0	0	0	0
Count Total	0	0	0	0	0	90	0	447	0	0	433	194	6	814	621	0	2,605		0	1	0	0
Peak Hour	0	0	0	0	0	47	0	226	0	0	232	107	3	436	308	0	1,359		0	1	0	0

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

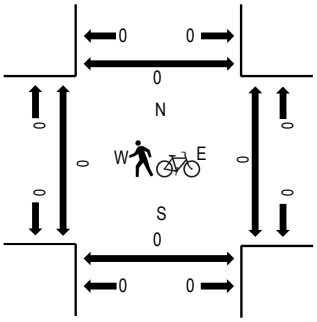
Location: 1 N RIDGE RD & E PLUM CREEK PKWY AM
Date: Tuesday, September 24, 2019
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:00 AM - 07:15 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

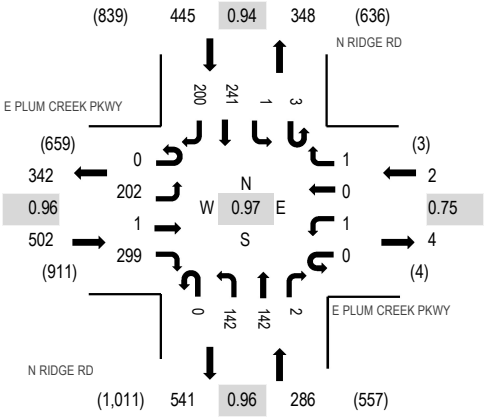
Interval Start Time	E PLUM CREEK PKWY Eastbound				E PLUM CREEK PKWY Westbound				N RIDGE RD Northbound				N RIDGE RD Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	18	0	49	0	0	0	0	0	105	75	0	0	0	17	26	290	1,087	0	0	0	0
7:15 AM	0	32	0	28	0	0	0	0	0	84	85	0	0	0	18	40	287	989	0	0	0	0
7:30 AM	0	23	0	21	0	0	0	0	0	109	54	0	0	0	26	56	289	905	0	0	0	0
7:45 AM	0	32	0	20	0	0	0	1	0	73	50	0	0	0	12	33	221	806	0	0	0	0
8:00 AM	0	36	0	35	0	0	0	0	0	46	30	0	0	0	22	23	192	818	0	0	0	0
8:15 AM	0	36	0	18	0	0	0	0	0	48	38	0	0	1	17	45	203		0	0	0	0
8:30 AM	0	32	0	18	0	0	0	1	0	40	35	0	0	0	28	36	190		0	0	0	0
8:45 AM	0	40	0	48	0	0	0	0	0	46	48	0	0	0	20	31	233		0	0	0	0
Count Total	0	249	0	237	0	0	0	2	0	551	415	0	0	1	160	290	1,905		0	0	0	0
Peak Hour	0	105	0	118	0	0	0	1	0	371	264	0	0	0	73	155	1,087		0	0	0	0

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

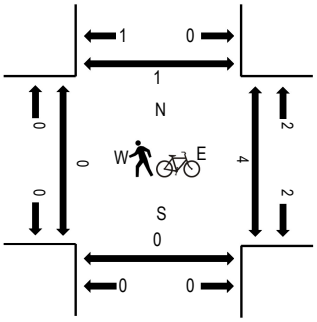
Location: 1 N RIDGE RD & E PLUM CREEK PKWY PM
Date: Tuesday, September 24, 2019
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



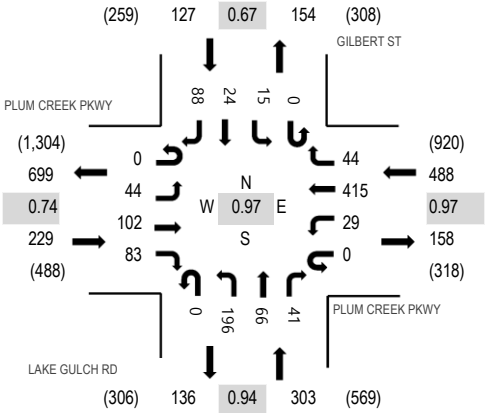
Traffic Counts

Interval Start Time	E PLUM CREEK PKWY Eastbound				E PLUM CREEK PKWY Westbound				N RIDGE RD Northbound				N RIDGE RD Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	37	0	58	0	0	0	0	1	42	33	0	0	0	46	44	261	1,175	0	1	0	0
4:15 PM	0	28	0	71	0	0	0	0	0	42	30	0	0	0	72	49	292	1,233	0	0	0	0
4:30 PM	0	53	0	76	0	0	0	0	0	40	31	0	0	1	63	51	315	1,235	0	3	0	0
4:45 PM	0	50	0	73	0	0	0	0	0	37	35	1	2	0	57	52	307	1,192	0	0	0	0
5:00 PM	0	50	0	69	0	1	0	0	0	33	39	1	1	0	67	58	319	1,135	0	0	0	0
5:15 PM	0	49	1	81	0	0	0	1	0	32	37	0	0	0	54	39	294		0	0	0	0
5:30 PM	0	50	0	57	0	0	0	0	1	35	37	0	1	0	58	33	272		0	0	0	0
5:45 PM	0	51	0	57	0	0	0	1	1	30	19	0	1	0	48	42	250		0	0	0	0
Count Total	0	368	1	542	0	1	0	2	3	291	261	2	5	1	465	368	2,310		0	4	0	0
Peak Hour	0	202	1	299	0	1	0	1	0	142	142	2	3	1	241	200	1,235		0	3	0	0

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

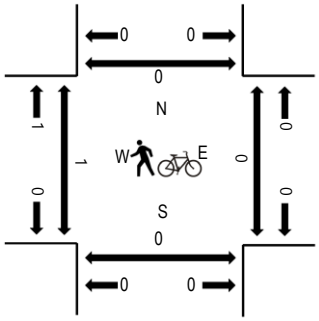
Location: 1 LAKE GULCH RD & PLUM CREEK PKWY AM
Date and Start Time: Tuesday, June 19, 2018
Peak Hour: 07:15 AM - 08:15 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



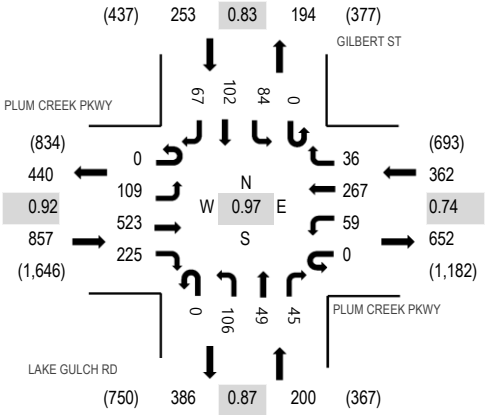
Traffic Counts

Interval Start Time	PLUM CREEK PKWY Eastbound				PLUM CREEK PKWY Westbound				LAKE GULCH RD Northbound				GILBERT ST Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	10	16	23	0	7	103	8	0	53	12	4	0	4	8	11	259	1,126	0	0	0	0
7:15 AM	0	13	22	17	0	7	112	7	0	47	18	10	0	5	6	20	284	1,147	0	0	0	0
7:30 AM	0	11	33	19	0	6	106	10	0	49	14	8	0	6	6	18	286	1,115	0	0	0	0
7:45 AM	0	14	17	25	0	6	104	14	0	50	19	12	0	2	4	30	297	1,116	1	0	0	0
8:00 AM	0	6	30	22	0	10	93	13	0	50	15	11	0	2	8	20	280	1,110	0	0	0	0
8:15 AM	0	14	22	23	0	7	86	6	0	39	13	10	0	5	9	18	252		0	0	0	0
8:30 AM	0	16	46	28	0	8	85	10	0	44	19	6	0	3	7	15	287		0	0	0	0
8:45 AM	0	9	31	21	0	18	81	13	0	38	24	4	0	9	11	32	291		0	0	0	0
Count Total	0	93	217	178	0	69	770	81	0	370	134	65	0	36	59	164	2,236		1	0	0	0
Peak Hour	0	44	102	83	0	29	415	44	0	196	66	41	0	15	24	88	1,147		1	0	0	0

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

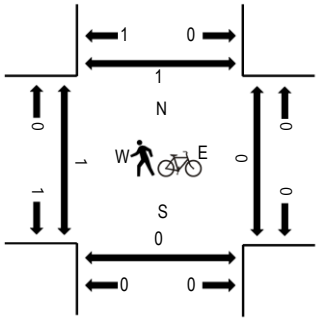
Location: 1 LAKE GULCH RD & PLUM CREEK PKWY PM
Date and Start Time: Tuesday, June 19, 2018
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	PLUM CREEK PKWY Eastbound				PLUM CREEK PKWY Westbound				LAKE GULCH RD Northbound				GILBERT ST Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	29	94	50	0	17	56	11	0	15	8	4	0	12	21	13	330	1,501	0	0	0	0
4:15 PM	0	21	108	51	0	10	62	11	0	33	11	8	0	9	16	14	354	1,597	0	0	0	0
4:30 PM	0	33	112	43	0	13	56	3	0	26	15	20	0	27	27	22	397	1,672	0	0	0	0
4:45 PM	0	29	141	54	0	8	54	17	0	32	18	10	0	13	22	22	420	1,670	0	0	0	0
5:00 PM	0	29	141	70	0	6	73	5	0	24	7	9	0	24	24	14	426	1,642	0	0	0	0
5:15 PM	0	18	129	58	0	32	84	11	0	24	9	6	0	20	29	9	429		0	0	0	1
5:30 PM	0	29	124	64	0	10	60	9	0	25	12	10	0	14	23	15	395		1	0	0	1
5:45 PM	0	21	132	66	0	14	59	12	0	26	9	6	0	9	22	16	392		0	0	0	0
Count Total	0	209	981	456	0	110	504	79	0	205	89	73	0	128	184	125	3,143		1	0	0	2
Peak Hour	0	109	523	225	0	59	267	36	0	106	49	45	0	84	102	67	1,672		0	0	0	1

All Traffic Data Services
www.alltrafficdata.net

Site Code: 3
Station ID:
N RIDGE RD N.O. ENDERUD BLVD

Start Time	05-Jun-19 Wed	NB	SB							Total
12:00 AM		36	44							80
01:00		14	18							32
02:00		12	13							25
03:00		12	6							18
04:00		78	5							83
05:00		232	17							249
06:00		499	91							590
07:00		**587**	160							747
08:00		524	248							**772**
09:00		425	246							671
10:00		363	306							669
11:00		425	**333**							758
12:00 PM		400	355							755
01:00		357	389							746
02:00		379	390							769
03:00		377	509							886
04:00		418	688							1106
05:00		469	**744**							**1213**
06:00		**523**	628							1151
07:00		291	436							727
08:00		250	366							616
09:00		188	251							439
10:00		97	154							251
11:00		72	93							165
Total		7028	6490							13518
Percent		52.0%	48.0%							
AM Peak	-	07:00	11:00	-	-	-	-	-	-	08:00
Vol.	-	587	333	-	-	-	-	-	-	772
PM Peak	-	18:00	17:00	-	-	-	-	-	-	17:00
Vol.	-	523	744	-	-	-	-	-	-	1213
Grand Total		7028	6490							13518
Percent		52.0%	48.0%							
ADT		ADT 13,518		AADT 13,518						

All Traffic Data Services

Wheat Ridge, CO 80033

Date Start: 19-Jun-18
Date End: 19-Jun-18
Site Code: 3
PLUM CREEK PKWY E/O LAKE GULCH RD

Start Time	19-Jun-18 Tue	EB	WB							Total
12:00 AM		42	19							61
01:00		27	12							39
02:00		7	5							12
03:00		9	13							22
04:00		11	62							73
05:00		28	211							239
06:00		68	436							504
07:00		140	**493**							**633**
08:00		205	413							618
09:00		234	333							567
10:00		226	284							510
11:00		**279**	336							615
12:00 PM		300	321							621
01:00		271	278							549
02:00		332	232							564
03:00		405	270							675
04:00		566	324							890
05:00		**618**	**366**							**984**
06:00		517	267							784
07:00		327	182							509
08:00		257	145							402
09:00		187	102							289
10:00		154	71							225
11:00		67	26							93
Total		5277	5201							10478
Percent		50.4%	49.6%							
AM Peak	-	11:00	07:00	-	-	-	-	-	-	07:00
Vol.	-	279	493	-	-	-	-	-	-	633
PM Peak	-	17:00	17:00	-	-	-	-	-	-	17:00
Vol.	-	618	366	-	-	-	-	-	-	984
Grand Total		5277	5201							10478
Percent		50.4%	49.6%							
ADT		ADT 10,478		AADT 10,478						

APPENDIX B

Level of Service Definitions

The following information can be found in the Highway Capacity Manual, Transportation Research Board, 2010: Chapter 18 – Signalized Intersections and Chapter 19 – Two-Way Stop Controlled Intersections.

Automobile Level of Service (LOS) for Signalized Intersections

Levels of service are defined to represent reasonable ranges in control delay.

LOS A

Describes operations with a control delay of 10s/veh or less and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If it is due to favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.

LOS B

Describes operations with control delay between 10 and 20 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

LOS C

Describes operations with control delay between 20 and 35 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.

LOS D

Describes operations with control delay between 35 and 55 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

LOS E

Describes operations with control delay between 55 and 80 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

LOS F

Describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

Level of Service (LOS) for Unsignalized TWSC Intersections

Level of Service	Average Control Delay (s/veh)
A	0 - 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35 - 50
F	> 50

APPENDIX C

Capacity Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	168	102	73	379	580	271	373	40	188	110	110
Future Volume (vph)	55	168	102	73	379	580	271	373	40	188	110	110
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.183			0.559			0.663			0.372		
Satd. Flow (perm)	341	1863	1583	1041	1863	1583	1235	1863	1583	693	1863	1583
Satd. Flow (RTOR)			185			630			185			185
Lane Group Flow (vph)	60	183	111	79	412	630	295	405	43	204	120	120
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	24.0		10.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	10.0	35.0		10.0	35.0		15.0	40.0		15.0	40.0	
Total Split (%)	10.0%	35.0%		10.0%	35.0%		15.0%	40.0%		15.0%	40.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	30.1	26.1	100.0	30.1	26.1	100.0	51.9	41.2	100.0	49.9	40.2	100.0
Actuated g/C Ratio	0.30	0.26	1.00	0.30	0.26	1.00	0.52	0.41	1.00	0.50	0.40	1.00
v/c Ratio	0.35	0.38	0.07	0.23	0.85	0.40	0.42	0.53	0.03	0.45	0.16	0.08
Control Delay	25.3	31.8	0.1	22.2	51.5	0.8	16.0	24.4	0.0	16.5	22.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.3	31.8	0.1	22.2	51.5	0.8	16.0	24.4	0.0	16.5	22.3	0.1
LOS	C	C	A	C	D	A	B	C	A	B	C	A
Approach Delay		20.7			20.9			19.7			13.6	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	25	94	0	33	245	0	86	121	0	66	53	0
Queue Length 95th (ft)	49	150	0	62	348	0	160	234	m0	115	94	0
Internal Link Dist (ft)		757			1153			1027			804	
Turn Bay Length (ft)	360		415	590		825	230		320	600		
Base Capacity (vph)	173	558	1583	349	558	1583	703	767	1583	461	749	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.33	0.07	0.23	0.74	0.40	0.42	0.53	0.03	0.44	0.16	0.08

Intersection Summary

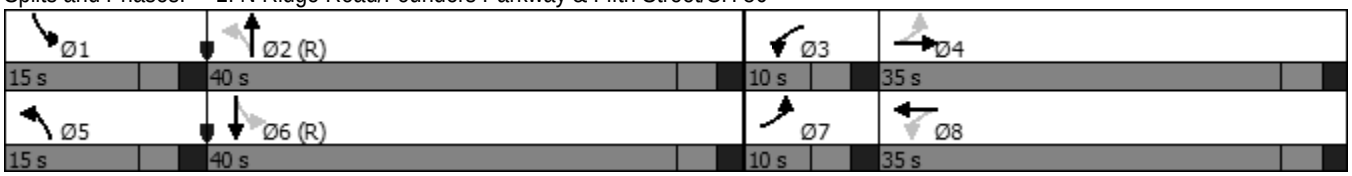
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 70
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 19.3	Intersection LOS: B
Intersection Capacity Utilization 70.8%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: N Ridge Road/Founders Parkway & Fifth Street/SH 86



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	31	40	786	78	43	260
Future Volume (vph)	31	40	786	78	43	260
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.248	
Satd. Flow (perm)	1770	1583	1863	1583	462	1863
Satd. Flow (RTOR)		43		73		
Lane Group Flow (vph)	34	43	854	85	47	283
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	10.0	24.0
Total Split (s)	25.0	25.0	65.0	65.0	10.0	75.0
Total Split (%)	25.0%	25.0%	65.0%	65.0%	10.0%	75.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	7.4	7.4	78.9	78.9	84.7	85.7
Actuated g/C Ratio	0.07	0.07	0.79	0.79	0.85	0.86
v/c Ratio	0.26	0.27	0.58	0.07	0.10	0.18
Control Delay	47.9	17.8	8.5	1.7	2.1	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	17.8	8.5	1.7	2.1	1.8
LOS	D	B	A	A	A	A
Approach Delay	31.1		7.9			1.8
Approach LOS	C		A			A
Queue Length 50th (ft)	21	0	243	2	2	16
Queue Length 95th (ft)	51	33	405	16	11	48
Internal Link Dist (ft)	982		2143			1027
Turn Bay Length (ft)	150			180	285	
Base Capacity (vph)	354	351	1470	1264	469	1596
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.12	0.58	0.07	0.10	0.18

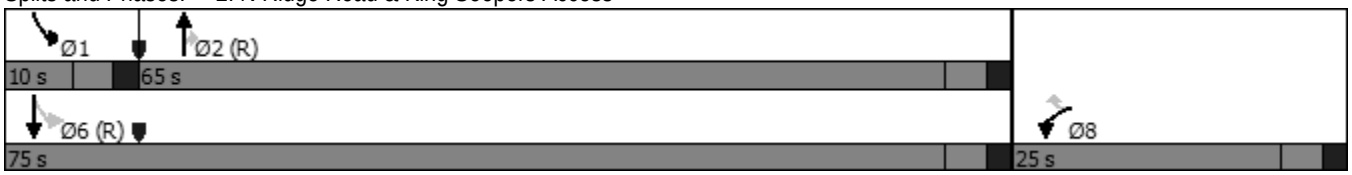
Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 7.7	Intersection LOS: A
Intersection Capacity Utilization 53.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: N Ridge Road & King Soopers Access



Intersection	
Intersection Delay, s/veh	5.8
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	2	1	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	518	349	282
Demand Flow Rate, veh/h	529	356	288
Vehicles Circulating, veh/h	319	107	82
Vehicles Exiting, veh/h	144	263	766
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	7.3	5.3	3.8
Approach LOS	A	A	A

Lane	Left	Right	Left	Left	Right
Designated Moves	L	TR	TR	L	TR
Assumed Moves	L	TR	TR	L	TR
RT Channelized					
Lane Util	0.155	0.845	1.000	0.372	0.628
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328
Entry Flow, veh/h	82	447	356	107	181
Cap Entry Lane, veh/h	1007	1083	1297	1252	1324
Entry HV Adj Factor	0.976	0.980	0.980	0.981	0.980
Flow Entry, veh/h	80	438	349	105	177
Cap Entry, veh/h	982	1061	1270	1228	1299
V/C Ratio	0.081	0.413	0.275	0.085	0.137
Control Delay, s/veh	4.4	7.8	5.3	3.6	3.9
LOS	A	A	A	A	A
95th %tile Queue, veh	0	2	1	0	0

Intersection	
Intersection Delay, s/veh	9.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	293	1	835	300
Demand Flow Rate, veh/h	299	1	852	306
Vehicles Circulating, veh/h	98	993	141	498
Vehicles Exiting, veh/h	498	0	256	496
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.1	7.2	13.9	1.8
Approach LOS	A	A	B	A

Lane	Left	Left	Left	Left	Bypass
Designated Moves	LTR	LTR	LTR	LT	R
Assumed Moves	LTR	LTR	LTR	LT	R
RT Channelized					Free
Lane Util	1.000	1.000	1.000	1.000	
Follow-Up Headway, s	2.609	2.609	2.609	2.609	
Critical Headway, s	4.976	4.976	4.976	4.976	208
Entry Flow, veh/h	299	1	852	98	1938
Cap Entry Lane, veh/h	1249	501	1195	830	0.980
Entry HV Adj Factor	0.980	1.000	0.980	0.980	204
Flow Entry, veh/h	293	1	835	96	1900
Cap Entry, veh/h	1224	501	1171	814	0.107
V/C Ratio	0.239	0.002	0.713	0.118	0.0
Control Delay, s/veh	5.1	7.2	13.9	5.6	A
LOS	A	A	B	A	0
95th %tile Queue, veh	1	0	6	0	

Intersection	
Intersection Delay, s/veh	6.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	309	654	406	171
Demand Flow Rate, veh/h	315	667	414	174
Vehicles Circulating, veh/h	92	419	221	874
Vehicles Exiting, veh/h	956	216	186	212
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.0	7.6	6.6	8.6
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	R	LT	TR	LTR	LTR
Assumed Moves	LT	R	LT	TR	LTR	LTR
RT Channelized						
Lane Util	0.638	0.362	0.469	0.531	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
Entry Flow, veh/h	201	114	313	354	414	174
Cap Entry Lane, veh/h	1240	1313	918	995	1177	676
Entry HV Adj Factor	0.981	0.982	0.982	0.979	0.981	0.985
Flow Entry, veh/h	197	112	307	347	406	171
Cap Entry, veh/h	1217	1290	901	974	1155	665
V/C Ratio	0.162	0.087	0.341	0.356	0.352	0.258
Control Delay, s/veh	4.3	3.5	7.7	7.5	6.6	8.6
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	0	2	2	2	1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	449	398	103	241	338	196	316	67	555	461	123
Future Volume (vph)	132	449	398	103	241	338	196	316	67	555	461	123
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.330			0.137			0.421			0.219		
Satd. Flow (perm)	615	1863	1583	255	1863	1583	784	1863	1583	408	1863	1583
Satd. Flow (RTOR)			433			367			200			200
Lane Group Flow (vph)	143	488	433	112	262	367	213	343	73	603	501	134
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	24.0		10.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	15.0	40.0		10.0	35.0		20.0	35.0		35.0	50.0	
Total Split (%)	12.5%	33.3%		8.3%	29.2%		16.7%	29.2%		29.2%	41.7%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	43.3	33.7	120.0	34.1	29.1	120.0	42.5	30.0	120.0	66.3	48.8	120.0
Actuated g/C Ratio	0.36	0.28	1.00	0.28	0.24	1.00	0.35	0.25	1.00	0.55	0.41	1.00
v/c Ratio	0.46	0.93	0.27	0.83	0.58	0.23	0.56	0.74	0.05	1.04	0.66	0.08
Control Delay	31.0	68.2	0.4	73.3	45.8	0.3	21.1	44.6	0.1	75.3	35.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	68.2	0.4	73.3	45.8	0.3	21.1	44.6	0.1	75.3	35.2	0.1
LOS	C	E	A	E	D	A	C	D	A	E	D	A
Approach Delay		35.6			27.4			31.5			50.9	
Approach LOS		D			C			C			D	
Queue Length 50th (ft)	75	363	0	57	178	0	68	246	0	~421	319	0
Queue Length 95th (ft)	124	#558	0	#135	267	0	118	258	0	#649	459	0
Internal Link Dist (ft)		757			1153			1027			804	
Turn Bay Length (ft)	360		415	590		825	230		320	600		
Base Capacity (vph)	320	543	1583	135	465	1583	417	465	1583	580	756	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.90	0.27	0.83	0.56	0.23	0.51	0.74	0.05	1.04	0.66	0.08

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated

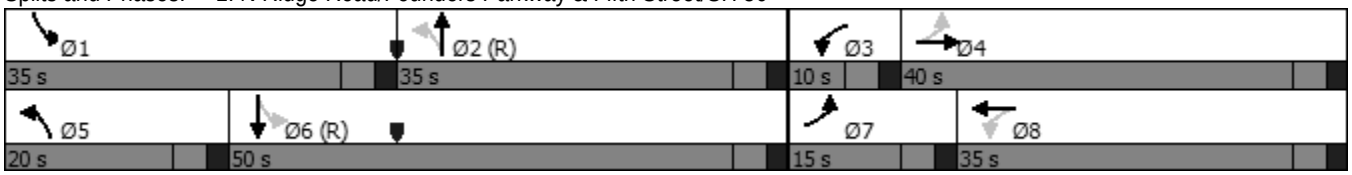
Maximum v/c Ratio: 1.04

Intersection Signal Delay: 38.4	Intersection LOS: D
Intersection Capacity Utilization 93.4%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: N Ridge Road/Founders Parkway & Fifth Street/SH 86



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	176	124	397	125	270	583
Future Volume (vph)	176	124	397	125	270	583
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.422	
Satd. Flow (perm)	1770	1583	1863	1583	786	1863
Satd. Flow (RTOR)		135		136		
Lane Group Flow (vph)	191	135	432	136	293	634
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	10.0	24.0
Total Split (s)	30.0	30.0	60.0	60.0	30.0	90.0
Total Split (%)	25.0%	25.0%	50.0%	50.0%	25.0%	75.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	18.1	18.1	75.4	75.4	91.9	91.9
Actuated g/C Ratio	0.15	0.15	0.63	0.63	0.77	0.77
v/c Ratio	0.72	0.38	0.37	0.13	0.42	0.44
Control Delay	62.8	10.1	13.2	2.4	4.3	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.8	10.1	13.2	2.4	4.3	3.8
LOS	E	B	B	A	A	A
Approach Delay	41.0		10.6			3.9
Approach LOS	D		B			A
Queue Length 50th (ft)	143	0	149	0	32	78
Queue Length 95th (ft)	210	53	273	29	m56	m127
Internal Link Dist (ft)	982		2143			1027
Turn Bay Length (ft)	150			180	285	
Base Capacity (vph)	368	436	1171	1045	806	1426
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.31	0.37	0.13	0.36	0.44

Intersection Summary

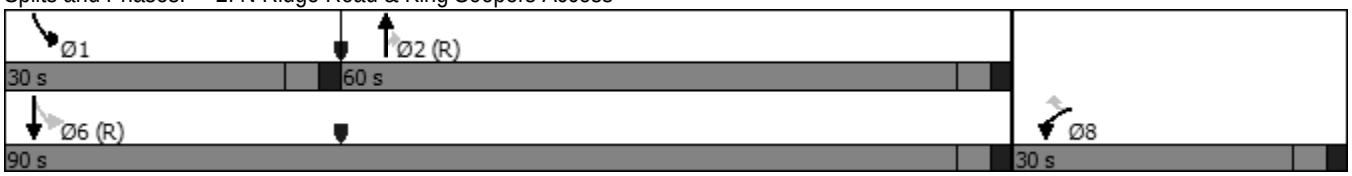
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 12.7	Intersection LOS: B
Intersection Capacity Utilization 58.1%	ICU Level of Service B
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: N Ridge Road & King Soopers Access



Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	2	1	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	360	446	982
Demand Flow Rate, veh/h	367	455	1002
Vehicles Circulating, veh/h	311	589	63
Vehicles Exiting, veh/h	733	476	615
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	5.7	11.6	6.8
Approach LOS	A	B	A

Lane	Left	Right	Left	Left	Right
Designated Moves	L	TR	TR	L	TR
Assumed Moves	L	TR	TR	L	TR
RT Channelized					
Lane Util	0.172	0.828	1.000	0.588	0.412
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328
Entry Flow, veh/h	63	304	455	589	413
Cap Entry Lane, veh/h	1014	1090	861	1274	1346
Entry HV Adj Factor	0.984	0.980	0.980	0.980	0.980
Flow Entry, veh/h	62	298	446	577	405
Cap Entry, veh/h	998	1069	844	1248	1320
V/C Ratio	0.062	0.279	0.529	0.462	0.307
Control Delay, s/veh	4.2	6.1	11.6	7.7	5.5
LOS	A	A	B	A	A
95th %tile Queue, veh	0	1	3	3	1

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	659	2	376	585
Demand Flow Rate, veh/h	672	2	384	596
Vehicles Circulating, veh/h	329	652	276	192
Vehicles Exiting, veh/h	191	8	725	462
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.7	5.1	7.4	3.3
Approach LOS	B	A	A	A

Lane	Left	Left	Left	Left	Bypass
Designated Moves	LTR	LTR	LTR	LT	R
Assumed Moves	LTR	LTR	LTR	LT	R
RT Channelized					Free
Lane Util	1.000	1.000	1.000	1.000	
Follow-Up Headway, s	2.609	2.609	2.609	2.609	
Critical Headway, s	4.976	4.976	4.976	4.976	268
Entry Flow, veh/h	672	2	384	328	1938
Cap Entry Lane, veh/h	987	710	1041	1134	0.980
Entry HV Adj Factor	0.981	1.000	0.980	0.981	263
Flow Entry, veh/h	659	2	376	322	1900
Cap Entry, veh/h	967	710	1020	1113	0.138
V/C Ratio	0.681	0.003	0.369	0.289	0.0
Control Delay, s/veh	14.7	5.1	7.4	6.0	A
LOS	B	A	A	A	0
95th %tile Queue, veh	6	0	2	1	

Intersection	
Intersection Delay, s/veh	6.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	273	486	269	339
Demand Flow Rate, veh/h	278	496	274	346
Vehicles Circulating, veh/h	336	361	331	591
Vehicles Exiting, veh/h	601	244	283	266
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.4	6.1	5.9	9.1
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	R	LT	TR	LTR	LTR
Assumed Moves	LT	R	LT	TR	LTR	LTR
RT Channelized						
Lane Util	0.777	0.223	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
Entry Flow, veh/h	216	62	233	263	274	346
Cap Entry Lane, veh/h	991	1067	968	1045	1072	859
Entry HV Adj Factor	0.980	0.984	0.980	0.979	0.981	0.981
Flow Entry, veh/h	212	61	228	257	269	339
Cap Entry, veh/h	971	1050	949	1023	1051	843
V/C Ratio	0.218	0.058	0.241	0.252	0.256	0.403
Control Delay, s/veh	5.8	3.9	6.2	6.0	5.9	9.1
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	0	1	1	1	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	175	106	76	394	603	282	388	42	196	114	114
Future Volume (vph)	57	175	106	76	394	603	282	388	42	196	114	114
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.306			0.632			0.637			0.506		
Satd. Flow (perm)	570	3539	1583	1177	3539	1583	1187	3539	1583	943	3539	1583
Satd. Flow (RTOR)			185			619			185			185
Lane Group Flow (vph)	62	190	115	83	428	655	307	422	46	213	124	124
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	24.0		10.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	10.0	35.0		10.0	35.0		15.0	40.0		15.0	40.0	
Total Split (%)	10.0%	35.0%		10.0%	35.0%		15.0%	40.0%		15.0%	40.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	21.4	17.4	100.0	21.4	17.4	100.0	62.1	48.8	100.0	57.1	46.3	100.0
Actuated g/C Ratio	0.21	0.17	1.00	0.21	0.17	1.00	0.62	0.49	1.00	0.57	0.46	1.00
v/c Ratio	0.34	0.31	0.07	0.30	0.69	0.41	0.38	0.24	0.03	0.34	0.08	0.08
Control Delay	31.4	36.6	0.1	30.1	44.7	0.8	10.0	15.1	0.0	10.3	18.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	36.6	0.1	30.1	44.7	0.8	10.0	15.1	0.0	10.3	18.1	0.1
LOS	C	D	A	C	D	A	A	B	A	B	B	A
Approach Delay		24.3			19.0			12.2			9.7	
Approach LOS		C			B			B			A	
Queue Length 50th (ft)	30	56	0	40	136	0	81	65	0	53	23	0
Queue Length 95th (ft)	59	84	0	74	178	0	123	90	0	98	48	0
Internal Link Dist (ft)		757			1153			1027			804	
Turn Bay Length (ft)	360		415	590		825	230		320	600		
Base Capacity (vph)	182	1061	1583	281	1061	1583	821	1728	1583	641	1639	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.18	0.07	0.30	0.40	0.41	0.37	0.24	0.03	0.33	0.08	0.08

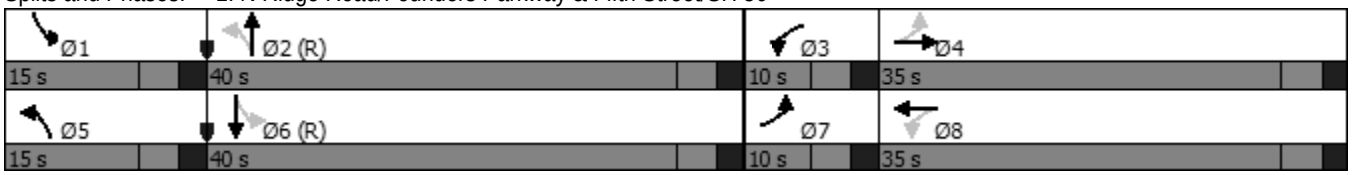
Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 70
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 16.2	Intersection LOS: B
Intersection Capacity Utilization 53.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: N Ridge Road/Founders Parkway & Fifth Street/SH 86



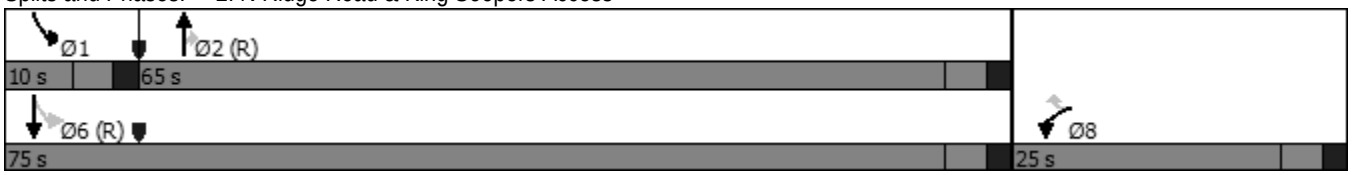
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	32	42	817	81	45	270
Future Volume (vph)	32	42	817	81	45	270
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.283	
Satd. Flow (perm)	1770	1583	3539	1583	527	3539
Satd. Flow (RTOR)		46		88		
Lane Group Flow (vph)	35	46	888	88	49	293
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	10.0	24.0
Total Split (s)	25.0	25.0	65.0	65.0	10.0	75.0
Total Split (%)	25.0%	25.0%	65.0%	65.0%	10.0%	75.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	7.5	7.5	76.7	76.7	84.6	85.6
Actuated g/C Ratio	0.08	0.08	0.77	0.77	0.85	0.86
v/c Ratio	0.27	0.29	0.33	0.07	0.09	0.10
Control Delay	47.9	17.5	5.4	1.3	2.4	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	17.5	5.4	1.3	2.4	1.8
LOS	D	B	A	A	A	A
Approach Delay	30.6		5.0			1.9
Approach LOS	C		A			A
Queue Length 50th (ft)	21	0	96	0	3	10
Queue Length 95th (ft)	52	34	142	14	13	28
Internal Link Dist (ft)	982		2143			1027
Turn Bay Length (ft)	150			180	285	
Base Capacity (vph)	354	353	2714	1234	520	3029
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.13	0.33	0.07	0.09	0.10

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.33

Intersection Signal Delay: 5.7	Intersection LOS: A
Intersection Capacity Utilization 43.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: N Ridge Road & King Soopers Access



Intersection	
Intersection Delay, s/veh	5.6
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	539	363	295
Demand Flow Rate, veh/h	550	371	301
Vehicles Circulating, veh/h	333	112	86
Vehicles Exiting, veh/h	150	275	797
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	7.6	4.2	3.9
Approach LOS	A	A	A

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	LT	TR	L	TR
Assumed Moves	L	TR	LT	TR	L	TR
RT Channelized						
Lane Util	0.156	0.844	0.469	0.531	0.372	0.628
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	86	464	174	197	112	189
Cap Entry Lane, veh/h	994	1070	1218	1291	1247	1320
Entry HV Adj Factor	0.977	0.981	0.982	0.978	0.982	0.980
Flow Entry, veh/h	84	455	171	193	110	185
Cap Entry, veh/h	971	1049	1196	1263	1225	1294
V/C Ratio	0.087	0.434	0.143	0.153	0.090	0.143
Control Delay, s/veh	4.5	8.2	4.2	4.1	3.7	4.0
LOS	A	A	A	A	A	A
95th %tile Queue, veh	0	2	0	1	0	0

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	305	1	869	309
Demand Flow Rate, veh/h	311	1	886	315
Vehicles Circulating, veh/h	102	1032	146	518
Vehicles Exiting, veh/h	518	0	267	515
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.2	7.5	15.2	1.9
Approach LOS	A	A	C	A

Lane	Left	Left	Left	Left	Bypass
Designated Moves	LTR	LTR	LTR	LT	R
Assumed Moves	LTR	LTR	LTR	LT	R
RT Channelized					Free
Lane Util	1.000	1.000	1.000	1.000	
Follow-Up Headway, s	2.609	2.609	2.609	2.609	
Critical Headway, s	4.976	4.976	4.976	4.976	213
Entry Flow, veh/h	311	1	886	102	1938
Cap Entry Lane, veh/h	1244	482	1189	814	0.980
Entry HV Adj Factor	0.981	1.000	0.981	0.980	209
Flow Entry, veh/h	305	1	869	100	1900
Cap Entry, veh/h	1220	482	1166	798	0.110
V/C Ratio	0.250	0.002	0.745	0.125	0.0
Control Delay, s/veh	5.2	7.5	15.2	5.8	A
LOS	A	A	C	A	0
95th %tile Queue, veh	1	0	7	0	

Intersection	
Intersection Delay, s/veh	7.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	320	679	423	178
Demand Flow Rate, veh/h	326	693	431	181
Vehicles Circulating, veh/h	95	435	229	909
Vehicles Exiting, veh/h	995	225	192	219
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.1	8.0	6.8	9.1
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	R	LT	TR	LTR	LTR
Assumed Moves	LT	R	LT	TR	LTR	LTR
RT Channelized						
Lane Util	0.638	0.362	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
Entry Flow, veh/h	208	118	326	367	431	181
Cap Entry Lane, veh/h	1237	1310	905	981	1169	656
Entry HV Adj Factor	0.982	0.983	0.980	0.981	0.982	0.985
Flow Entry, veh/h	204	116	319	360	423	178
Cap Entry, veh/h	1214	1288	886	963	1148	646
V/C Ratio	0.168	0.090	0.360	0.374	0.369	0.276
Control Delay, s/veh	4.4	3.5	8.1	7.8	6.8	9.1
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	0	2	2	2	1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	467	414	107	251	352	204	329	70	577	479	128
Future Volume (vph)	137	467	414	107	251	352	204	329	70	577	479	128
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.362			0.280			0.459			0.416		
Satd. Flow (perm)	674	3539	1583	522	3539	1583	855	3539	1583	775	3539	1583
Satd. Flow (RTOR)			450			383			200			200
Lane Group Flow (vph)	149	508	450	116	273	383	222	358	76	627	521	139
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	24.0		10.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	15.0	40.0		10.0	35.0		20.0	35.0		35.0	50.0	
Total Split (%)	12.5%	33.3%		8.3%	29.2%		16.7%	29.2%		29.2%	41.7%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	32.5	22.7	120.0	23.0	18.0	120.0	49.5	37.6	120.0	77.3	60.4	120.0
Actuated g/C Ratio	0.27	0.19	1.00	0.19	0.15	1.00	0.41	0.31	1.00	0.64	0.50	1.00
v/c Ratio	0.55	0.76	0.28	0.77	0.52	0.24	0.50	0.32	0.05	0.80	0.29	0.09
Control Delay	41.8	53.4	0.5	68.3	49.9	0.4	15.4	27.3	0.1	21.6	19.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	53.4	0.5	68.3	49.9	0.4	15.4	27.3	0.1	21.6	19.2	0.1
LOS	D	D	A	E	D	A	B	C	A	C	B	A
Approach Delay		30.3			28.1			20.1			18.3	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	92	198	0	70	104	0	65	72	0	247	118	0
Queue Length 95th (ft)	140	243	0	#126	140	0	107	103	0	#408	188	0
Internal Link Dist (ft)		757			1153			1027			804	
Turn Bay Length (ft)	360		415	590		825	230		320	600		
Base Capacity (vph)	275	1032	1583	151	884	1583	493	1109	1583	790	1780	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.49	0.28	0.77	0.31	0.24	0.45	0.32	0.05	0.79	0.29	0.09

Intersection Summary

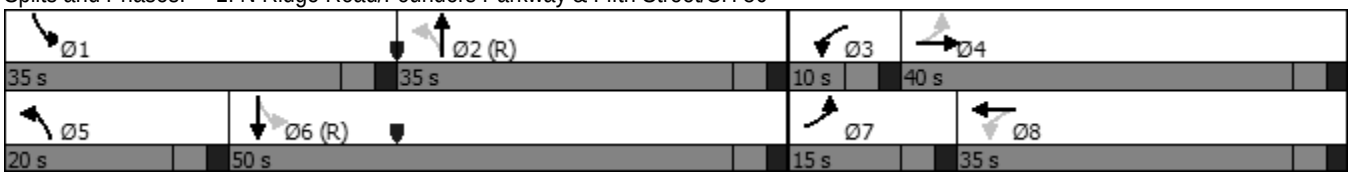
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 24.1	Intersection LOS: C
Intersection Capacity Utilization 76.6%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: N Ridge Road/Founders Parkway & Fifth Street/SH 86



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	183	129	413	130	281	606
Future Volume (vph)	183	129	413	130	281	606
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.450	
Satd. Flow (perm)	1770	1583	3539	1583	838	3539
Satd. Flow (RTOR)		140		141		
Lane Group Flow (vph)	199	140	449	141	305	659
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	10.0	24.0
Total Split (s)	30.0	30.0	60.0	60.0	30.0	90.0
Total Split (%)	25.0%	25.0%	50.0%	50.0%	25.0%	75.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	18.6	18.6	74.5	74.5	91.4	91.4
Actuated g/C Ratio	0.16	0.16	0.62	0.62	0.76	0.76
v/c Ratio	0.73	0.38	0.20	0.14	0.42	0.24
Control Delay	62.9	9.8	11.2	2.4	5.7	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.9	9.8	11.2	2.4	5.7	3.1
LOS	E	A	B	A	A	A
Approach Delay	41.0		9.1			3.9
Approach LOS	D		A			A
Queue Length 50th (ft)	149	0	73	0	38	43
Queue Length 95th (ft)	217	54	127	30	m67	67
Internal Link Dist (ft)	982		2143			1027
Turn Bay Length (ft)	150			180	285	
Base Capacity (vph)	368	440	2198	1036	831	2694
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.32	0.20	0.14	0.37	0.24

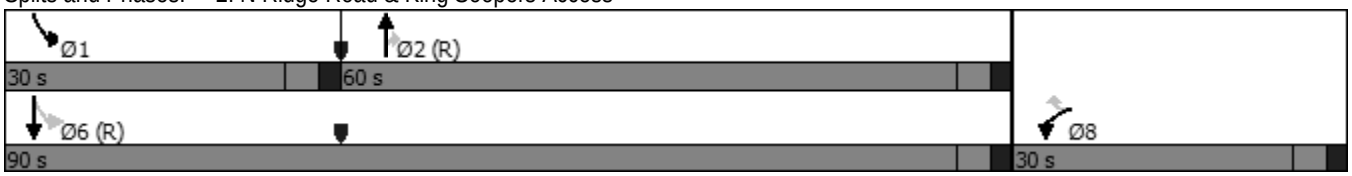
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 49.6%	ICU Level of Service A
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: N Ridge Road & King Soopers Access



Intersection	
Intersection Delay, s/veh	7.0
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	374	464	1022
Demand Flow Rate, veh/h	381	473	1042
Vehicles Circulating, veh/h	323	612	65
Vehicles Exiting, veh/h	762	495	639
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	5.9	7.9	7.0
Approach LOS	A	A	A

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	LT	TR	L	TR
Assumed Moves	L	TR	LT	TR	L	TR
RT Channelized						
Lane Util	0.171	0.829	0.469	0.531	0.587	0.413
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	65	316	222	251	612	430
Cap Entry Lane, veh/h	1003	1079	769	844	1271	1344
Entry HV Adj Factor	0.985	0.981	0.982	0.979	0.980	0.980
Flow Entry, veh/h	64	310	218	246	600	422
Cap Entry, veh/h	987	1059	755	826	1247	1317
V/C Ratio	0.065	0.293	0.289	0.297	0.481	0.320
Control Delay, s/veh	4.2	6.3	8.1	7.7	7.9	5.6
LOS	A	A	A	A	A	A
95th %tile Queue, veh	0	1	1	1	3	1

Intersection	
Intersection Delay, s/veh	9.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	687	2	392	609
Demand Flow Rate, veh/h	701	2	400	621
Vehicles Circulating, veh/h	343	680	288	200
Vehicles Exiting, veh/h	199	8	756	482
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	16.5	5.2	7.8	3.4
Approach LOS	C	A	A	A

Lane	Left	Left	Left	Left	Bypass
Designated Moves	LTR	LTR	LTR	LT	R
Assumed Moves	LTR	LTR	LTR	LT	R
RT Channelized					Free
Lane Util	1.000	1.000	1.000	1.000	
Follow-Up Headway, s	2.609	2.609	2.609	2.609	
Critical Headway, s	4.976	4.976	4.976	4.976	279
Entry Flow, veh/h	701	2	400	342	1938
Cap Entry Lane, veh/h	973	690	1029	1125	0.980
Entry HV Adj Factor	0.980	1.000	0.980	0.981	274
Flow Entry, veh/h	687	2	392	335	1900
Cap Entry, veh/h	953	690	1008	1103	0.144
V/C Ratio	0.721	0.003	0.389	0.304	0.0
Control Delay, s/veh	16.5	5.2	7.8	6.2	A
LOS	C	A	A	A	1
95th %tile Queue, veh	6	0	2	1	

Intersection	
Intersection Delay, s/veh	6.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	282	506	279	351
Demand Flow Rate, veh/h	287	516	284	358
Vehicles Circulating, veh/h	349	374	342	615
Vehicles Exiting, veh/h	624	252	294	275
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.5	6.3	6.0	9.7
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	R	LT	TR	LTR	LTR
Assumed Moves	LT	R	LT	TR	LTR	LTR
RT Channelized						
Lane Util	0.777	0.223	0.471	0.529	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
Entry Flow, veh/h	223	64	243	273	284	358
Cap Entry Lane, veh/h	979	1056	957	1033	1062	842
Entry HV Adj Factor	0.980	0.984	0.978	0.982	0.981	0.981
Flow Entry, veh/h	219	63	238	268	279	351
Cap Entry, veh/h	960	1039	936	1014	1042	826
V/C Ratio	0.228	0.061	0.254	0.264	0.267	0.425
Control Delay, s/veh	6.0	4.0	6.4	6.1	6.0	9.7
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	0	1	1	1	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	252	153	110	569	870	407	560	60	282	165	165
Future Volume (vph)	83	252	153	110	569	870	407	560	60	282	165	165
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.214			0.508			0.950			0.950		
Satd. Flow (perm)	399	3539	1583	946	3539	1583	3433	3539	1583	3433	3539	1583
Satd. Flow (RTOR)			185			614			185			185
Lane Group Flow (vph)	90	274	166	120	618	946	442	609	65	307	179	179
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	24.0		10.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	11.0	32.0		11.0	32.0		26.0	35.0		22.0	31.0	
Total Split (%)	11.0%	32.0%		11.0%	32.0%		26.0%	35.0%		22.0%	31.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	27.0	21.0	100.0	28.0	23.2	100.0	17.7	39.0	100.0	14.0	35.3	100.0
Actuated g/C Ratio	0.27	0.21	1.00	0.28	0.23	1.00	0.18	0.39	1.00	0.14	0.35	1.00
v/c Ratio	0.48	0.37	0.10	0.38	0.75	0.60	0.73	0.44	0.04	0.64	0.14	0.11
Control Delay	31.1	34.0	0.1	27.3	41.9	1.7	52.2	23.6	0.1	46.8	25.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.1	34.0	0.1	27.3	41.9	1.7	52.2	23.6	0.1	46.8	25.1	0.1
LOS	C	C	A	C	D	A	D	C	A	D	C	A
Approach Delay		22.9			18.3			33.5			28.4	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	40	77	0	54	195	0	157	108	0	96	41	0
Queue Length 95th (ft)	71	108	0	90	243	0	208	165	0	136	75	0
Internal Link Dist (ft)		757			1153			1027			804	
Turn Bay Length (ft)	360		415	590		825	230		320	600		
Base Capacity (vph)	189	955	1583	314	955	1583	720	1381	1583	583	1250	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.29	0.10	0.38	0.65	0.60	0.61	0.44	0.04	0.53	0.14	0.11

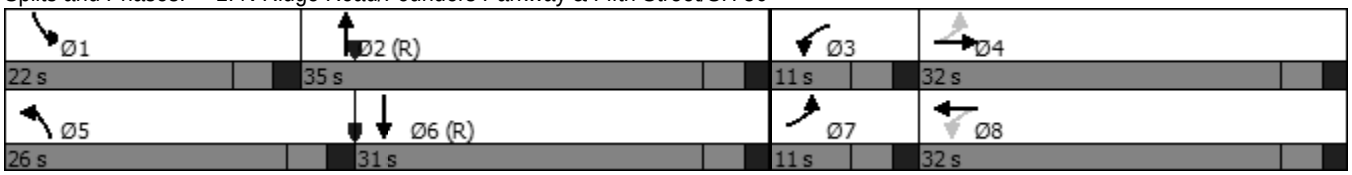
Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 70
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 24.8	Intersection LOS: C
Intersection Capacity Utilization 60.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: N Ridge Road/Founders Parkway & Fifth Street/SH 86



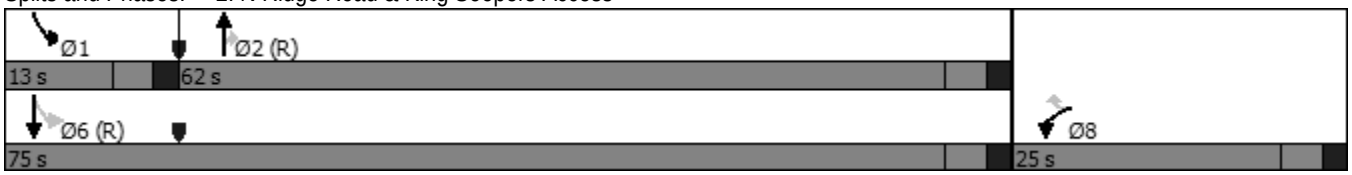
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	47	60	1179	117	65	390
Future Volume (vph)	47	60	1179	117	65	390
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.170	
Satd. Flow (perm)	1770	1583	3539	1583	317	3539
Satd. Flow (RTOR)		65		127		
Lane Group Flow (vph)	51	65	1282	127	71	424
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	10.0	24.0
Total Split (s)	25.0	25.0	62.0	62.0	13.0	75.0
Total Split (%)	25.0%	25.0%	62.0%	62.0%	13.0%	75.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	8.3	8.3	75.6	75.6	83.8	84.8
Actuated g/C Ratio	0.08	0.08	0.76	0.76	0.84	0.85
v/c Ratio	0.35	0.34	0.48	0.10	0.20	0.14
Control Delay	49.0	15.8	7.2	1.3	3.8	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.0	15.8	7.2	1.3	3.8	1.6
LOS	D	B	A	A	A	A
Approach Delay	30.4		6.7			1.9
Approach LOS	C		A			A
Queue Length 50th (ft)	31	0	172	0	4	14
Queue Length 95th (ft)	67	40	253	18	15	33
Internal Link Dist (ft)	982		2143			1027
Turn Bay Length (ft)	150			180	285	
Base Capacity (vph)	354	368	2675	1227	381	3000
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.18	0.48	0.10	0.19	0.14

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 6.9	Intersection LOS: A
Intersection Capacity Utilization 53.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: N Ridge Road & King Soopers Access



Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	779	524	425
Demand Flow Rate, veh/h	794	534	433
Vehicles Circulating, veh/h	479	162	123
Vehicles Exiting, veh/h	217	394	1150
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	14.7	5.0	4.4
Approach LOS	B	A	A

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	LT	TR	LT	TR
Assumed Moves	L	TR	LT	TR	LT	TR
RT Channelized						
Lane Util	0.155	0.845	0.470	0.530	0.471	0.529
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	123	671	251	283	204	229
Cap Entry Lane, veh/h	869	945	1163	1237	1205	1279
Entry HV Adj Factor	0.984	0.981	0.980	0.981	0.978	0.983
Flow Entry, veh/h	121	658	246	278	200	225
Cap Entry, veh/h	855	927	1140	1213	1179	1257
V/C Ratio	0.142	0.710	0.216	0.229	0.169	0.179
Control Delay, s/veh	5.6	16.3	5.1	5.0	4.5	4.4
LOS	A	C	A	A	A	A
95th %tile Queue, veh	0	6	1	1	1	1

Intersection	
Intersection Delay, s/veh	57.4
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	442	2	1254	450
Demand Flow Rate, veh/h	451	2	1279	459
Vehicles Circulating, veh/h	146	1491	212	748
Vehicles Exiting, veh/h	748	0	385	745
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.5	12.0	95.7	2.7
Approach LOS	A	B	F	A

Lane	Left	Right	Left	Left	Left	Bypass
Designated Moves	LT	R	LTR	LTR	LT	R
Assumed Moves	LT	R	LTR	LTR	LT	R
RT Channelized						Free
Lane Util	0.470	0.530	1.000	1.000	1.000	
Follow-Up Headway, s	2.535	2.535	2.609	2.609	2.609	
Critical Headway, s	4.544	4.544	4.976	4.976	4.976	313
Entry Flow, veh/h	212	239	2	1279	146	1938
Cap Entry Lane, veh/h	1243	1243	302	1112	643	0.980
Entry HV Adj Factor	0.981	0.979	1.000	0.980	0.980	307
Flow Entry, veh/h	208	234	2	1254	143	1900
Cap Entry, veh/h	1220	1217	302	1089	631	0.162
V/C Ratio	0.170	0.192	0.007	1.151	0.227	0.0
Control Delay, s/veh	4.4	4.6	12.0	95.7	8.5	A
LOS	A	A	B	F	A	1
95th %tile Queue, veh	1	1	0	34	1	

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	463	980	612	256
Demand Flow Rate, veh/h	472	1000	625	262
Vehicles Circulating, veh/h	136	631	331	1311
Vehicles Exiting, veh/h	1437	325	277	320
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.7	15.3	11.0	20.4
Approach LOS	A	C	B	C

Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LTR	LTR
Assumed Moves	LT	TR	LT	TR	LTR	LTR
RT Channelized						
Lane Util	0.470	0.530	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
Entry Flow, veh/h	222	250	470	530	625	262
Cap Entry Lane, veh/h	1191	1265	755	831	1072	466
Entry HV Adj Factor	0.980	0.981	0.980	0.980	0.980	0.977
Flow Entry, veh/h	218	245	461	520	612	256
Cap Entry, veh/h	1167	1241	741	814	1050	455
V/C Ratio	0.186	0.198	0.622	0.638	0.583	0.562
Control Delay, s/veh	4.7	4.6	15.6	15.1	11.0	20.4
LOS	A	A	C	C	B	C
95th %tile Queue, veh	1	1	4	5	4	3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	198	674	597	155	362	507	294	474	101	833	692	185
Future Volume (vph)	198	674	597	155	362	507	294	474	101	833	692	185
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.278			0.179			0.950			0.950		
Satd. Flow (perm)	518	3539	1583	333	3539	1583	3433	3539	1583	3433	3539	1583
Satd. Flow (RTOR)			462			551			245			245
Lane Group Flow (vph)	215	733	649	168	393	551	320	515	110	905	752	201
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	24.0		10.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	22.0	33.0		15.0	26.0		22.0	30.0		42.0	50.0	
Total Split (%)	18.3%	27.5%		12.5%	21.7%		18.3%	25.0%		35.0%	41.7%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	41.2	27.3	120.0	32.3	22.3	120.0	15.4	27.4	120.0	35.3	47.3	120.0
Actuated g/C Ratio	0.34	0.23	1.00	0.27	0.19	1.00	0.13	0.23	1.00	0.29	0.39	1.00
v/c Ratio	0.65	0.91	0.41	0.80	0.60	0.35	0.73	0.64	0.07	0.90	0.54	0.13
Control Delay	38.1	61.7	0.8	58.0	49.3	0.6	71.9	40.6	0.1	52.8	30.3	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	61.7	0.8	58.0	49.3	0.6	71.9	40.6	0.1	52.8	30.3	0.2
LOS	D	E	A	E	D	A	E	D	A	D	C	A
Approach Delay		33.7			26.5			46.5			38.0	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	121	290	0	92	148	0	132	195	0	339	238	0
Queue Length 95th (ft)	187	#395	0	#199	204	0	182	202	0	421	304	0
Internal Link Dist (ft)		757			1153			1027			804	
Turn Bay Length (ft)	360		415	590		825	230		320	600		
Base Capacity (vph)	359	825	1583	209	658	1583	486	807	1583	1058	1394	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.89	0.41	0.80	0.60	0.35	0.66	0.64	0.07	0.86	0.54	0.13

Intersection Summary

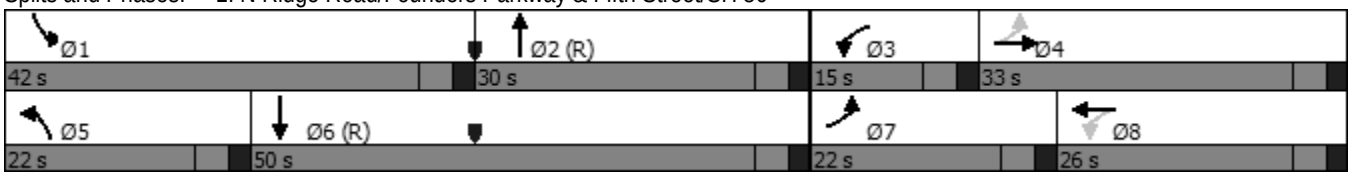
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 35.9	Intersection LOS: D
Intersection Capacity Utilization 80.8%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: N Ridge Road/Founders Parkway & Fifth Street/SH 86



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	264	186	596	188	405	875
Future Volume (vph)	264	186	596	188	405	875
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.316	
Satd. Flow (perm)	1770	1583	3539	1583	589	3539
Satd. Flow (RTOR)		202		204		
Lane Group Flow (vph)	287	202	648	204	440	951
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	10.0	24.0
Total Split (s)	38.0	38.0	40.0	40.0	42.0	82.0
Total Split (%)	31.7%	31.7%	33.3%	33.3%	35.0%	68.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	24.8	24.8	59.1	59.1	85.2	85.2
Actuated g/C Ratio	0.21	0.21	0.49	0.49	0.71	0.71
v/c Ratio	0.79	0.41	0.37	0.23	0.70	0.38
Control Delay	59.9	7.4	22.8	4.4	25.7	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.9	7.4	22.8	4.4	25.7	6.2
LOS	E	A	C	A	C	A
Approach Delay	38.2		18.4			12.4
Approach LOS	D		B			B
Queue Length 50th (ft)	212	0	155	0	152	98
Queue Length 95th (ft)	287	57	284	54	m278	140
Internal Link Dist (ft)	982		2143			1027
Turn Bay Length (ft)	150			180	285	
Base Capacity (vph)	486	581	1742	882	782	2513
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.35	0.37	0.23	0.56	0.38

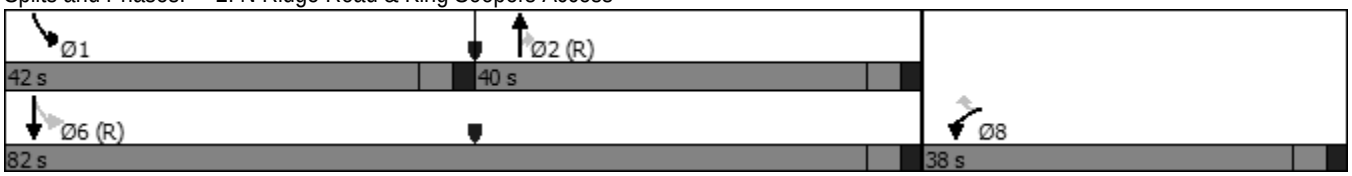
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 18.9	Intersection LOS: B
Intersection Capacity Utilization 66.0%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: N Ridge Road & King Soopers Access



Intersection	
Intersection Delay, s/veh	11.7
Intersection LOS	B

Approach	WB	NB	SB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	540	671	1475
Demand Flow Rate, veh/h	551	684	1504
Vehicles Circulating, veh/h	468	883	95
Vehicles Exiting, veh/h	1099	716	924
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	8.9	15.0	11.1
Approach LOS	A	C	B

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	LT	TR	LT	TR
Assumed Moves	L	TR	LT	TR	L	TR
RT Channelized						
Lane Util	0.172	0.828	0.469	0.531	0.587	0.413
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	95	456	321	363	883	621
Cap Entry Lane, veh/h	878	954	599	670	1237	1310
Entry HV Adj Factor	0.979	0.980	0.982	0.979	0.981	0.980
Flow Entry, veh/h	93	447	315	356	866	609
Cap Entry, veh/h	859	935	588	657	1213	1284
V/C Ratio	0.108	0.478	0.536	0.541	0.714	0.474
Control Delay, s/veh	5.2	9.7	15.6	14.5	13.6	7.7
LOS	A	A	C	B	B	A
95th %tile Queue, veh	0	3	3	3	7	3

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	990	4	563	880
Demand Flow Rate, veh/h	1010	4	575	898
Vehicles Circulating, veh/h	497	978	417	288
Vehicles Exiting, veh/h	286	14	1090	694
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	12.9	7.2	14.1	5.1
Approach LOS	B	A	B	A

Lane	Left	Right	Left	Left	Left	Bypass
Designated Moves	LT	R	LTR	LTR	LT	R
Assumed Moves	LT	R	LTR	LTR	LT	R
RT Channelized						Free
Lane Util	0.404	0.596	1.000	1.000	1.000	
Follow-Up Headway, s	2.535	2.535	2.609	2.609	2.609	
Critical Headway, s	4.544	4.544	4.976	4.976	4.976	403
Entry Flow, veh/h	408	602	4	575	495	1938
Cap Entry Lane, veh/h	903	903	509	902	1029	0.980
Entry HV Adj Factor	0.980	0.980	1.000	0.980	0.981	395
Flow Entry, veh/h	400	590	4	563	485	1900
Cap Entry, veh/h	886	885	509	884	1009	0.208
V/C Ratio	0.452	0.666	0.008	0.638	0.481	0.0
Control Delay, s/veh	9.6	15.1	7.2	14.1	9.2	A
LOS	A	C	A	B	A	1
95th %tile Queue, veh	2	5	0	5	3	

Intersection	
Intersection Delay, s/veh	13.0
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	409	731	405	509
Demand Flow Rate, veh/h	417	745	413	519
Vehicles Circulating, veh/h	504	542	497	888
Vehicles Exiting, veh/h	903	368	424	399
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.7	9.7	9.3	25.9
Approach LOS	A	A	A	D

Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LTR	LTR
Assumed Moves	L	TR	LT	TR	LTR	LTR
RT Channelized						
Lane Util	0.532	0.468	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
Entry Flow, veh/h	222	195	350	395	413	519
Cap Entry Lane, veh/h	849	925	820	896	931	668
Entry HV Adj Factor	0.982	0.979	0.982	0.981	0.981	0.981
Flow Entry, veh/h	218	191	344	388	405	509
Cap Entry, veh/h	834	906	805	879	913	655
V/C Ratio	0.261	0.211	0.427	0.441	0.444	0.778
Control Delay, s/veh	7.1	6.1	9.9	9.5	9.3	25.9
LOS	A	A	A	A	A	D
95th %tile Queue, veh	1	1	2	2	2	7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	175	120	81	394	603	320	451	53	196	138	114
Future Volume (vph)	57	175	120	81	394	603	320	451	53	196	138	114
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.306			0.632			0.610			0.470		
Satd. Flow (perm)	570	3539	1583	1177	3539	1583	1136	3539	1583	875	3539	1583
Satd. Flow (RTOR)			185			596			185			185
Lane Group Flow (vph)	62	190	130	88	428	655	348	490	58	213	150	124
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	24.0		10.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	10.0	35.0		10.0	35.0		15.0	40.0		15.0	40.0	
Total Split (%)	10.0%	35.0%		10.0%	35.0%		15.0%	40.0%		15.0%	40.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	21.4	17.4	100.0	21.4	17.4	100.0	63.0	48.8	100.0	56.2	45.4	100.0
Actuated g/C Ratio	0.21	0.17	1.00	0.21	0.17	1.00	0.63	0.49	1.00	0.56	0.45	1.00
v/c Ratio	0.34	0.31	0.08	0.31	0.69	0.41	0.43	0.28	0.04	0.36	0.09	0.08
Control Delay	31.4	36.6	0.1	30.6	44.7	0.8	10.7	15.3	0.0	10.7	18.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	36.6	0.1	30.6	44.7	0.8	10.7	15.3	0.0	10.7	18.6	0.1
LOS	C	D	A	C	D	A	B	B	A	B	B	A
Approach Delay		23.3			19.1			12.5			10.4	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	30	56	0	43	136	0	94	75	0	53	29	0
Queue Length 95th (ft)	59	84	0	78	178	0	137	101	0	98	56	0
Internal Link Dist (ft)		757			1153			1027			804	
Turn Bay Length (ft)	360		415	590		825	230		320	600		
Base Capacity (vph)	182	1061	1583	281	1061	1583	810	1728	1583	601	1608	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.18	0.08	0.31	0.40	0.41	0.43	0.28	0.04	0.35	0.09	0.08

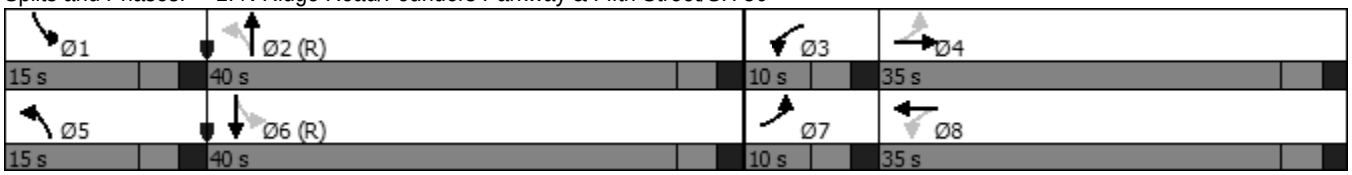
Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 70
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 16.2	Intersection LOS: B
Intersection Capacity Utilization 55.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: N Ridge Road/Founders Parkway & Fifth Street/SH 86



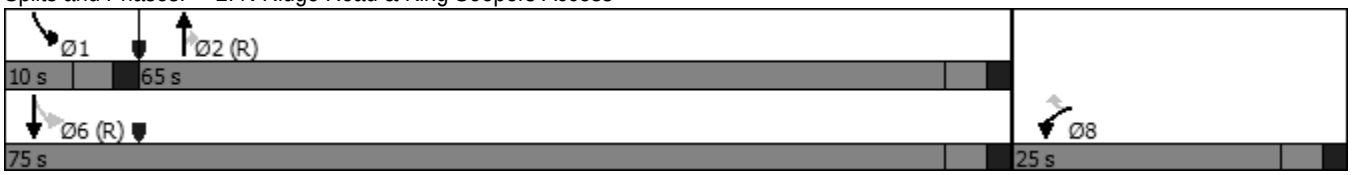
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	32	42	919	81	45	313
Future Volume (vph)	32	42	919	81	45	313
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.247	
Satd. Flow (perm)	1770	1583	3539	1583	460	3539
Satd. Flow (RTOR)		46		88		
Lane Group Flow (vph)	35	46	999	88	49	340
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	10.0	24.0
Total Split (s)	25.0	25.0	65.0	65.0	10.0	75.0
Total Split (%)	25.0%	25.0%	65.0%	65.0%	10.0%	75.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	7.5	7.5	76.7	76.7	84.6	85.6
Actuated g/C Ratio	0.08	0.08	0.77	0.77	0.85	0.86
v/c Ratio	0.27	0.29	0.37	0.07	0.10	0.11
Control Delay	47.9	17.5	5.7	1.3	2.6	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	17.5	5.7	1.3	2.6	1.8
LOS	D	B	A	A	A	A
Approach Delay	30.6		5.3			1.9
Approach LOS	C		A			A
Queue Length 50th (ft)	21	0	113	0	3	12
Queue Length 95th (ft)	52	34	165	14	13	31
Internal Link Dist (ft)	982		1322			1027
Turn Bay Length (ft)	150			180	285	
Base Capacity (vph)	354	353	2714	1234	467	3029
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.13	0.37	0.07	0.10	0.11

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.37

Intersection Signal Delay: 5.8	Intersection LOS: A
Intersection Capacity Utilization 46.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: N Ridge Road & King Soopers Access



Intersection	
Intersection Delay, s/veh	6.6
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	176	539	419	411
Demand Flow Rate, veh/h	179	550	428	419
Vehicles Circulating, veh/h	484	514	236	115
Vehicles Exiting, veh/h	50	150	427	949
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.8	9.7	5.0	4.4
Approach LOS	A	A	A	A

Lane	Left	Left	Right	Left	Right	Left	Right
Designated Moves	LTR	LT	R	LT	TR	LT	TR
Assumed Moves	LTR	LT	R	LT	TR	LT	TR
RT Channelized							
Lane Util	1.000	0.156	0.844	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	179	86	464	201	227	197	222
Cap Entry Lane, veh/h	941	841	917	1086	1162	1214	1288
Entry HV Adj Factor	0.983	0.977	0.981	0.980	0.978	0.981	0.982
Flow Entry, veh/h	176	84	455	197	222	193	218
Cap Entry, veh/h	925	822	900	1064	1137	1192	1265
V/C Ratio	0.190	0.102	0.506	0.185	0.195	0.162	0.172
Control Delay, s/veh	5.8	5.4	10.6	5.1	4.9	4.4	4.3
LOS	A	A	B	A	A	A	A
95th %tile Queue, veh	1	0	3	1	1	1	1

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	362	1	869	463
Demand Flow Rate, veh/h	369	1	886	472
Vehicles Circulating, veh/h	102	1090	204	518
Vehicles Exiting, veh/h	518	0	267	573
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.7	8.0	18.3	1.2
Approach LOS	A	A	C	A

Lane	Left	Left	Left	Left	Bypass
Designated Moves	LTR	LTR	LTR	LT	R
Assumed Moves	LTR	LTR	LTR	LT	R
RT Channelized					Free
Lane Util	1.000	1.000	1.000	1.000	
Follow-Up Headway, s	2.609	2.609	2.609	2.609	
Critical Headway, s	4.976	4.976	4.976	4.976	370
Entry Flow, veh/h	369	1	886	102	1938
Cap Entry Lane, veh/h	1244	454	1121	814	0.980
Entry HV Adj Factor	0.981	1.000	0.981	0.980	363
Flow Entry, veh/h	362	1	869	100	1900
Cap Entry, veh/h	1220	454	1099	798	0.191
V/C Ratio	0.297	0.002	0.791	0.125	0.0
Control Delay, s/veh	5.7	8.0	18.3	5.8	A
LOS	A	A	C	A	1
95th %tile Queue, veh	1	0	9	0	

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	377	829	423	178
Demand Flow Rate, veh/h	384	846	431	181
Vehicles Circulating, veh/h	95	435	287	1062
Vehicles Exiting, veh/h	1148	283	192	219
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.4	9.3	7.3	10.8
Approach LOS	A	A	A	B

Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	R	LT	TR	LTR	LTR
Assumed Moves	LT	R	LT	TR	LTR	LTR
RT Channelized						
Lane Util	0.693	0.307	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
Entry Flow, veh/h	266	118	398	448	431	181
Cap Entry Lane, veh/h	1237	1310	905	981	1113	576
Entry HV Adj Factor	0.981	0.983	0.979	0.981	0.982	0.985
Flow Entry, veh/h	261	116	390	440	423	178
Cap Entry, veh/h	1214	1288	886	963	1092	567
V/C Ratio	0.215	0.090	0.440	0.457	0.387	0.314
Control Delay, s/veh	4.9	3.5	9.4	9.1	7.3	10.8
LOS	A	A	A	A	A	B
95th %tile Queue, veh	1	0	2	2	2	1

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	88	26	817	290	24
Future Vol, veh/h	0	88	26	817	290	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	200	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	96	28	888	315	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	158	341	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	*985	1383	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %		1	1	-	-	-
Mov Cap-1 Maneuver	-	*985	1383	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	0.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1383	-	985	-	-
HCM Lane V/C Ratio	0.02	-	0.097	-	-
HCM Control Delay (s)	7.7	-	9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	467	455	120	251	352	230	372	79	577	548	128
Future Volume (vph)	137	467	455	120	251	352	230	372	79	577	548	128
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.362			0.280			0.427			0.369		
Satd. Flow (perm)	674	3539	1583	522	3539	1583	795	3539	1583	687	3539	1583
Satd. Flow (RTOR)			493			383			200			200
Lane Group Flow (vph)	149	508	495	130	273	383	250	404	86	627	596	139
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free	2		Free	6		Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	24.0		10.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	15.0	40.0		10.0	35.0		20.0	35.0		35.0	50.0	
Total Split (%)	12.5%	33.3%		8.3%	29.2%		16.7%	29.2%		29.2%	41.7%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	32.5	22.7	120.0	23.0	18.0	120.0	48.0	35.2	120.0	77.3	59.4	120.0
Actuated g/C Ratio	0.27	0.19	1.00	0.19	0.15	1.00	0.40	0.29	1.00	0.64	0.50	1.00
v/c Ratio	0.55	0.76	0.31	0.86	0.52	0.24	0.59	0.39	0.05	0.81	0.34	0.09
Control Delay	41.8	53.4	0.5	82.7	49.9	0.4	19.7	28.6	0.1	22.9	20.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	53.4	0.5	82.7	49.9	0.4	19.7	28.6	0.1	22.9	20.3	0.1
LOS	D	D	A	F	D	A	B	C	A	C	C	A
Approach Delay		29.2			31.2			22.3			19.5	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	92	198	0	79	104	0	73	79	0	247	141	0
Queue Length 95th (ft)	140	243	0	#154	140	0	150	111	0	#479	222	0
Internal Link Dist (ft)		757			1153			1027			804	
Turn Bay Length (ft)	360		415	590		825	230		320	600		
Base Capacity (vph)	275	1032	1583	151	884	1583	462	1037	1583	777	1752	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.49	0.31	0.86	0.31	0.24	0.54	0.39	0.05	0.81	0.34	0.09

Intersection Summary

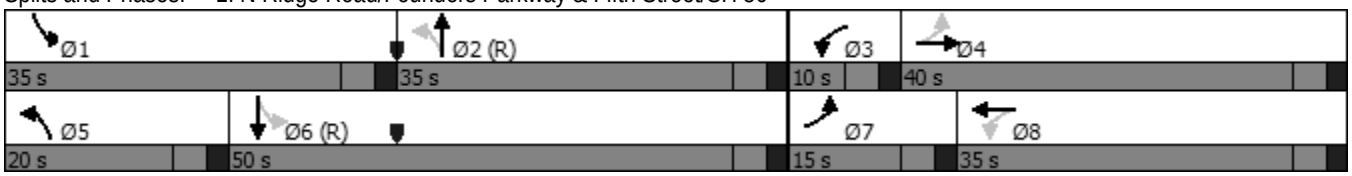
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 25.0	Intersection LOS: C
Intersection Capacity Utilization 78.5%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: N Ridge Road/Founders Parkway & Fifth Street/SH 86



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	183	129	491	130	281	729
Future Volume (vph)	183	129	491	130	281	729
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.406	
Satd. Flow (perm)	1770	1583	3539	1583	756	3539
Satd. Flow (RTOR)		140		141		
Lane Group Flow (vph)	199	140	534	141	305	792
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	10.0	24.0
Total Split (s)	30.0	30.0	60.0	60.0	30.0	90.0
Total Split (%)	25.0%	25.0%	50.0%	50.0%	25.0%	75.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	18.6	18.6	74.5	74.5	91.4	91.4
Actuated g/C Ratio	0.16	0.16	0.62	0.62	0.76	0.76
v/c Ratio	0.73	0.38	0.24	0.14	0.45	0.29
Control Delay	62.9	9.8	11.6	2.4	6.4	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.9	9.8	11.6	2.4	6.4	3.2
LOS	E	A	B	A	A	A
Approach Delay	41.0		9.7			4.1
Approach LOS	D		A			A
Queue Length 50th (ft)	149	0	90	0	39	54
Queue Length 95th (ft)	217	54	152	30	m65	m81
Internal Link Dist (ft)	982		1322			1027
Turn Bay Length (ft)	150			180	285	
Base Capacity (vph)	368	440	2198	1036	786	2694
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.32	0.24	0.14	0.39	0.29

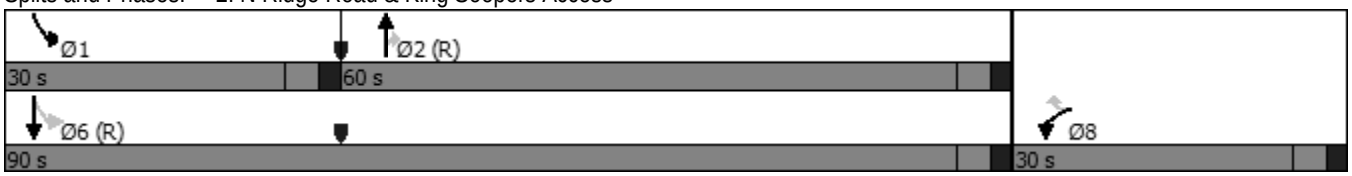
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 11.8	Intersection LOS: B
Intersection Capacity Utilization 51.8%	ICU Level of Service A
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: N Ridge Road & King Soopers Access



Intersection	
Intersection Delay, s/veh	9.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	123	374	629	1146
Demand Flow Rate, veh/h	126	381	642	1169
Vehicles Circulating, veh/h	1174	579	699	150
Vehicles Exiting, veh/h	145	762	601	810
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.5	7.9	10.7	8.3
Approach LOS	B	A	B	A

Lane	Left	Left	Right	Left	Right	Left	Right
Designated Moves	LTR	LT	R	LT	TR	LT	TR
Assumed Moves	LTR	LT	R	LT	TR	L	TR
RT Channelized							
Lane Util	1.000	0.171	0.829	0.470	0.530	0.524	0.476
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	126	65	316	302	340	612	557
Cap Entry Lane, veh/h	523	792	868	710	784	1176	1250
Entry HV Adj Factor	0.976	0.985	0.981	0.979	0.981	0.980	0.981
Flow Entry, veh/h	123	64	310	296	333	600	546
Cap Entry, veh/h	511	780	852	695	769	1153	1226
V/C Ratio	0.241	0.082	0.364	0.426	0.434	0.520	0.446
Control Delay, s/veh	10.5	5.4	8.4	11.1	10.4	9.1	7.5
LOS	B	A	A	B	B	A	A
95th %tile Queue, veh	1	0	2	2	2	3	2

Intersection	
Intersection Delay, s/veh	16.1
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	851	2	392	712
Demand Flow Rate, veh/h	868	2	400	727
Vehicles Circulating, veh/h	343	847	455	200
Vehicles Exiting, veh/h	199	8	756	649
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	29.9	6.2	10.1	2.9
Approach LOS	D	A	B	A

Lane	Left	Left	Left	Left	Bypass
Designated Moves	LTR	LTR	LTR	LT	R
Assumed Moves	LTR	LTR	LTR	LT	R
RT Channelized					Free
Lane Util	1.000	1.000	1.000	1.000	
Follow-Up Headway, s	2.609	2.609	2.609	2.609	
Critical Headway, s	4.976	4.976	4.976	4.976	385
Entry Flow, veh/h	868	2	400	342	1938
Cap Entry Lane, veh/h	973	582	868	1125	0.980
Entry HV Adj Factor	0.980	1.000	0.980	0.981	377
Flow Entry, veh/h	851	2	392	335	1900
Cap Entry, veh/h	953	582	850	1103	0.198
V/C Ratio	0.893	0.003	0.461	0.304	0.0
Control Delay, s/veh	29.9	6.2	10.1	6.2	A
LOS	D	A	B	A	1
95th %tile Queue, veh	13	0	2	1	

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	447	609	279	351
Demand Flow Rate, veh/h	456	621	284	358
Vehicles Circulating, veh/h	349	374	511	720
Vehicles Exiting, veh/h	729	421	294	275
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.6	6.9	7.3	11.2
Approach LOS	A	A	A	B

Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	R	LT	TR	LTR	LTR
Assumed Moves	LT	R	LT	TR	LTR	LTR
RT Channelized						
Lane Util	0.860	0.140	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
Entry Flow, veh/h	392	64	292	329	284	358
Cap Entry Lane, veh/h	979	1056	957	1033	920	770
Entry HV Adj Factor	0.980	0.984	0.979	0.980	0.981	0.981
Flow Entry, veh/h	384	63	286	323	279	351
Cap Entry, veh/h	960	1039	937	1013	902	755
V/C Ratio	0.400	0.061	0.305	0.318	0.309	0.465
Control Delay, s/veh	8.2	4.0	7.0	6.8	7.3	11.2
LOS	A	A	A	A	A	B
95th %tile Queue, veh	2	0	1	1	1	2

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	60	75	648	994	69
Future Vol, veh/h	0	60	75	648	994	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	200	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	65	82	704	1080	75

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	540	1155	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	*669	990	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %		1	1	-	-	-
Mov Cap-1 Maneuver	-	*669	990	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	0.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	990	-	669	-	-
HCM Lane V/C Ratio	0.082	-	0.097	-	-
HCM Control Delay (s)	9	-	11	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	252	167	115	569	870	445	623	71	282	189	165
Future Volume (vph)	83	252	167	115	569	870	445	623	71	282	189	165
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.214			0.508			0.950			0.950		
Satd. Flow (perm)	399	3539	1583	946	3539	1583	3433	3539	1583	3433	3539	1583
Satd. Flow (RTOR)			240			592			240			240
Lane Group Flow (vph)	90	274	182	125	618	946	484	677	77	307	205	179
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	24.0		10.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	11.0	32.0		11.0	32.0		27.0	37.0		20.0	30.0	
Total Split (%)	11.0%	32.0%		11.0%	32.0%		27.0%	37.0%		20.0%	30.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	27.0	21.0	100.0	28.0	23.2	100.0	18.8	39.5	100.0	13.5	34.2	100.0
Actuated g/C Ratio	0.27	0.21	1.00	0.28	0.23	1.00	0.19	0.40	1.00	0.14	0.34	1.00
v/c Ratio	0.48	0.37	0.11	0.40	0.75	0.60	0.75	0.48	0.05	0.66	0.17	0.11
Control Delay	31.1	34.0	0.1	27.8	41.9	1.7	49.0	27.2	0.1	48.1	26.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.1	34.0	0.1	27.8	41.9	1.7	49.0	27.2	0.1	48.1	26.1	0.1
LOS	C	C	A	C	D	A	D	C	A	D	C	A
Approach Delay		22.3			18.3			34.0			29.2	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)	40	77	0	56	195	0	171	132	0	96	48	0
Queue Length 95th (ft)	71	108	0	94	243	0	224	215	m0	139	85	0
Internal Link Dist (ft)		757			1153			1027			804	
Turn Bay Length (ft)	360		415	590		825	230		320	600		
Base Capacity (vph)	189	955	1583	314	955	1583	755	1396	1583	519	1210	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.29	0.11	0.40	0.65	0.60	0.64	0.48	0.05	0.59	0.17	0.11

Intersection Summary

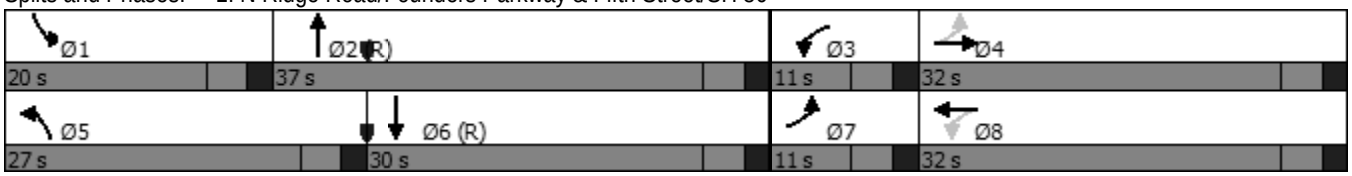
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 70
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 25.3	Intersection LOS: C
Intersection Capacity Utilization 62.3%	ICU Level of Service B
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: N Ridge Road/Founders Parkway & Fifth Street/SH 86



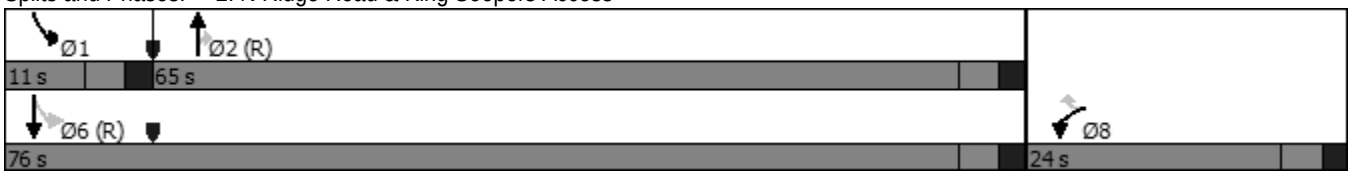
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	47	60	1291	117	65	433
Future Volume (vph)	47	60	1291	117	65	433
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.144	
Satd. Flow (perm)	1770	1583	3539	1583	268	3539
Satd. Flow (RTOR)		65		127		
Lane Group Flow (vph)	51	65	1403	127	71	471
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	10.0	24.0
Total Split (s)	24.0	24.0	65.0	65.0	11.0	76.0
Total Split (%)	24.0%	24.0%	65.0%	65.0%	11.0%	76.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	8.3	8.3	75.6	75.6	83.8	84.8
Actuated g/C Ratio	0.08	0.08	0.76	0.76	0.84	0.85
v/c Ratio	0.35	0.34	0.52	0.10	0.22	0.16
Control Delay	49.0	15.8	7.7	1.3	4.5	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.0	15.8	7.7	1.3	4.5	1.4
LOS	D	B	A	A	A	A
Approach Delay	30.4		7.2			1.8
Approach LOS	C		A			A
Queue Length 50th (ft)	31	0	200	0	4	14
Queue Length 95th (ft)	67	40	292	18	13	32
Internal Link Dist (ft)	982		1322			1027
Turn Bay Length (ft)	150			180	285	
Base Capacity (vph)	336	353	2675	1227	320	3000
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.18	0.52	0.10	0.22	0.16

Intersection Summary
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 7.1	Intersection LOS: A
Intersection Capacity Utilization 56.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: N Ridge Road & King Soopers Access



Intersection	
Intersection Delay, s/veh	12.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	176	779	580	542
Demand Flow Rate, veh/h	179	794	592	552
Vehicles Circulating, veh/h	654	661	286	152
Vehicles Exiting, veh/h	50	217	547	1303
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.9	23.4	6.1	5.1
Approach LOS	A	C	A	A

Lane	Left	Left	Right	Left	Right	Left	Right
Designated Moves	LTR	LT	R	LT	TR	LT	TR
Assumed Moves	LTR	LT	R	LT	TR	LT	TR
RT Channelized							
Lane Util	1.000	0.155	0.845	0.470	0.530	0.469	0.531
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	179	123	671	278	314	259	293
Cap Entry Lane, veh/h	814	735	810	1038	1114	1174	1248
Entry HV Adj Factor	0.983	0.984	0.981	0.981	0.979	0.983	0.980
Flow Entry, veh/h	176	121	658	273	307	255	287
Cap Entry, veh/h	801	723	794	1018	1090	1154	1223
V/C Ratio	0.220	0.167	0.829	0.268	0.282	0.221	0.235
Control Delay, s/veh	6.9	6.8	26.5	6.2	6.0	5.1	5.0
LOS	A	A	D	A	A	A	A
95th %tile Queue, veh	1	1	9	1	1	1	1

Intersection	
Intersection Delay, s/veh	67.5
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	498	2	1254	600
Demand Flow Rate, veh/h	508	2	1279	612
Vehicles Circulating, veh/h	146	1548	269	748
Vehicles Exiting, veh/h	748	0	385	802
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.7	12.8	123.9	2.0
Approach LOS	A	B	F	A

Lane	Left	Right	Left	Left	Left	Bypass
Designated Moves	LT	R	LTR	LTR	LT	R
Assumed Moves	LT	R	LTR	LTR	LT	R
RT Channelized						Free
Lane Util	0.530	0.470	1.000	1.000	1.000	
Follow-Up Headway, s	2.535	2.535	2.609	2.609	2.609	
Critical Headway, s	4.544	4.544	4.976	4.976	4.976	466
Entry Flow, veh/h	269	239	2	1279	146	1938
Cap Entry Lane, veh/h	1243	1243	285	1049	643	0.980
Entry HV Adj Factor	0.981	0.979	1.000	0.980	0.980	457
Flow Entry, veh/h	264	234	2	1254	143	1900
Cap Entry, veh/h	1220	1217	285	1028	631	0.241
V/C Ratio	0.216	0.192	0.007	1.220	0.227	0.0
Control Delay, s/veh	4.8	4.6	12.8	123.9	8.5	A
LOS	A	A	B	F	A	1
95th %tile Queue, veh	1	1	0	40	1	

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	520	1130	612	256
Demand Flow Rate, veh/h	530	1153	625	262
Vehicles Circulating, veh/h	136	631	389	1464
Vehicles Exiting, veh/h	1590	383	277	320
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.9	19.6	12.2	26.9
Approach LOS	A	C	B	D

Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LTR	LTR
Assumed Moves	LT	TR	LT	TR	LTR	LTR
RT Channelized						
Lane Util	0.470	0.530	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
Entry Flow, veh/h	249	281	542	611	625	262
Cap Entry Lane, veh/h	1191	1265	755	831	1020	409
Entry HV Adj Factor	0.981	0.980	0.980	0.980	0.980	0.977
Flow Entry, veh/h	244	275	531	599	612	256
Cap Entry, veh/h	1169	1240	740	814	1000	400
V/C Ratio	0.209	0.222	0.717	0.736	0.613	0.640
Control Delay, s/veh	4.9	4.8	19.8	19.3	12.2	26.9
LOS	A	A	C	C	B	D
95th %tile Queue, veh	1	1	6	7	4	4

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	88	26	1135	410	24
Future Vol, veh/h	0	88	26	1135	410	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	200	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	96	28	1234	446	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	223	472	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	*924	1342	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %		1	1	-	-	-
Mov Cap-1 Maneuver	-	*924	1342	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	0.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1342	-	924	-	-
HCM Lane V/C Ratio	0.021	-	0.104	-	-
HCM Control Delay (s)	7.7	-	9.3	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	198	674	638	168	362	507	320	517	110	833	761	185
Future Volume (vph)	198	674	638	168	362	507	320	517	110	833	761	185
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.311			0.168			0.950			0.950		
Satd. Flow (perm)	579	3539	1583	313	3539	1583	3433	3539	1583	3433	3539	1583
Satd. Flow (RTOR)			469			551			200			200
Lane Group Flow (vph)	215	733	693	183	393	551	348	562	120	905	827	201
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		Free	8		Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	24.0		10.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	21.0	33.0		16.0	28.0		24.0	30.0		41.0	47.0	
Total Split (%)	17.5%	27.5%		13.3%	23.3%		20.0%	25.0%		34.2%	39.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Min		None	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	41.8	27.3	120.0	34.8	23.8	120.0	16.7	26.9	120.0	34.8	45.0	120.0
Actuated g/C Ratio	0.35	0.23	1.00	0.29	0.20	1.00	0.14	0.22	1.00	0.29	0.38	1.00
v/c Ratio	0.62	0.91	0.44	0.82	0.56	0.35	0.73	0.71	0.08	0.91	0.62	0.13
Control Delay	36.3	61.7	0.9	57.6	47.1	0.6	69.9	43.6	0.1	54.9	33.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	61.7	0.9	57.6	47.1	0.6	69.9	43.6	0.1	54.9	33.8	0.2
LOS	D	E	A	E	D	A	E	D	A	D	C	A
Approach Delay		32.7			26.1			47.4			40.2	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	119	290	0	99	147	0	145	192	0	343	277	0
Queue Length 95th (ft)	184	#395	0	#213	200	0	195	235	0	#451	355	0
Internal Link Dist (ft)		757			1153			1027			804	
Turn Bay Length (ft)	360		415	590		825	230		320	600		
Base Capacity (vph)	367	825	1583	224	701	1583	543	793	1583	1029	1326	1583
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.89	0.44	0.82	0.56	0.35	0.64	0.71	0.08	0.88	0.62	0.13

Intersection Summary

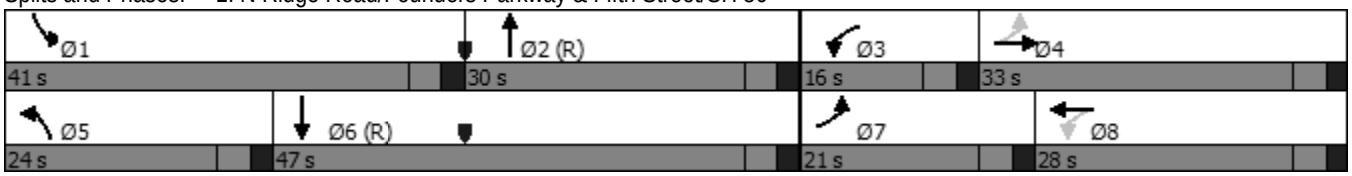
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 36.6	Intersection LOS: D
Intersection Capacity Utilization 82.7%	ICU Level of Service E
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: N Ridge Road/Founders Parkway & Fifth Street/SH 86



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	264	186	674	188	405	998
Future Volume (vph)	264	186	674	188	405	998
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.272	
Satd. Flow (perm)	1770	1583	3539	1583	507	3539
Satd. Flow (RTOR)		202		188		
Lane Group Flow (vph)	287	202	733	204	440	1085
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	24.0	24.0	24.0	24.0	10.0	24.0
Total Split (s)	36.0	36.0	42.0	42.0	42.0	84.0
Total Split (%)	30.0%	30.0%	35.0%	35.0%	35.0%	70.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	24.3	24.3	57.6	57.6	85.7	85.7
Actuated g/C Ratio	0.20	0.20	0.48	0.48	0.71	0.71
v/c Ratio	0.80	0.42	0.43	0.24	0.73	0.43
Control Delay	61.8	7.7	24.5	5.6	29.8	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.8	7.7	24.5	5.6	29.8	6.1
LOS	E	A	C	A	C	A
Approach Delay	39.4		20.4			12.9
Approach LOS	D		C			B
Queue Length 50th (ft)	212	0	191	6	179	111
Queue Length 95th (ft)	294	58	325	64	m301	151
Internal Link Dist (ft)	982		1322			1027
Turn Bay Length (ft)	150			180	285	
Base Capacity (vph)	457	558	1697	857	751	2526
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.36	0.43	0.24	0.59	0.43

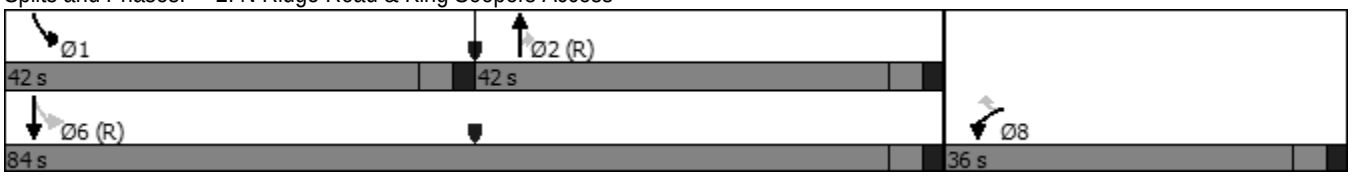
Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 19.7	Intersection LOS: B
Intersection Capacity Utilization 68.2%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: N Ridge Road & King Soopers Access



Intersection	
Intersection Delay, s/veh	16.9
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	123	540	835	1599
Demand Flow Rate, veh/h	126	551	852	1630
Vehicles Circulating, veh/h	1665	723	970	180
Vehicles Exiting, veh/h	145	1099	821	1094
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	18.6	13.2	24.6	14.1
Approach LOS	C	B	C	B

Lane	Left	Left	Right	Left	Right	Left	Right
Designated Moves	LTR	LT	R	LT	TR	LT	TR
Assumed Moves	LTR	LT	R	LT	TR	L	TR
RT Channelized							
Lane Util	1.000	0.172	0.828	0.469	0.531	0.542	0.458
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	126	95	456	400	452	883	747
Cap Entry Lane, veh/h	345	694	768	553	623	1144	1219
Entry HV Adj Factor	0.976	0.979	0.980	0.981	0.979	0.981	0.981
Flow Entry, veh/h	123	93	447	393	443	866	733
Cap Entry, veh/h	337	680	753	543	610	1122	1195
V/C Ratio	0.365	0.137	0.594	0.723	0.726	0.772	0.613
Control Delay, s/veh	18.6	6.8	14.5	25.7	23.6	17.0	10.7
LOS	C	A	B	D	C	C	B
95th %tile Queue, veh	2	0	4	6	6	8	4

Intersection	
Intersection Delay, s/veh	12.5
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	1154	4	563	983
Demand Flow Rate, veh/h	1177	4	575	1003
Vehicles Circulating, veh/h	497	1145	584	288
Vehicles Exiting, veh/h	286	14	1090	861
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.6	8.5	22.0	4.6
Approach LOS	B	A	C	A

Lane	Left	Right	Left	Left	Left	Bypass
Designated Moves	LT	R	LTR	LTR	LT	R
Assumed Moves	LT	R	LTR	LTR	LT	R
RT Channelized						Free
Lane Util	0.489	0.511	1.000	1.000	1.000	
Follow-Up Headway, s	2.535	2.535	2.609	2.609	2.609	
Critical Headway, s	4.544	4.544	4.976	4.976	4.976	508
Entry Flow, veh/h	575	602	4	575	495	1938
Cap Entry Lane, veh/h	903	903	429	761	1029	0.980
Entry HV Adj Factor	0.981	0.980	1.000	0.980	0.981	498
Flow Entry, veh/h	564	590	4	563	485	1900
Cap Entry, veh/h	886	885	429	745	1009	0.262
V/C Ratio	0.636	0.666	0.009	0.756	0.481	0.0
Control Delay, s/veh	14.1	15.1	8.5	22.0	9.2	A
LOS	B	C	A	C	A	1
95th %tile Queue, veh	5	5	0	7	3	

Intersection	
Intersection Delay, s/veh	15.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	1	1
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	573	834	405	509
Demand Flow Rate, veh/h	584	850	413	519
Vehicles Circulating, veh/h	504	542	664	993
Vehicles Exiting, veh/h	1008	535	424	399
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.8	10.9	11.8	35.2
Approach LOS	A	B	B	E

Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LTR	LTR
Assumed Moves	LT	TR	LT	TR	LTR	LTR
RT Channelized						
Lane Util	0.469	0.531	0.471	0.529	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
Entry Flow, veh/h	274	310	400	450	413	519
Cap Entry Lane, veh/h	849	925	820	896	808	611
Entry HV Adj Factor	0.982	0.979	0.980	0.982	0.981	0.981
Flow Entry, veh/h	269	304	392	442	405	509
Cap Entry, veh/h	834	906	804	880	792	599
V/C Ratio	0.323	0.335	0.488	0.502	0.511	0.850
Control Delay, s/veh	8.0	7.6	11.1	10.7	11.8	35.2
LOS	A	A	B	B	B	E
95th %tile Queue, veh	1	1	3	3	3	9

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	60	75	904	1411	69
Future Vol, veh/h	0	60	75	904	1411	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	200	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	65	82	983	1534	75

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	767	1609	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	*491	*734	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %		1	1	-	-	-
Mov Cap-1 Maneuver	-	*491	*734	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.5	0.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	* 734	-	491	-	-
HCM Lane V/C Ratio	0.111	-	0.133	-	-
HCM Control Delay (s)	10.5	-	13.5	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

APPENDIX D

Roundabout Capacity Worksheets

Intersection	
Intersection Delay, s/veh	6.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	367	1166	775	461
Demand Flow Rate, veh/h	374	1190	790	469
Vehicles Circulating, veh/h	428	806	474	835
Vehicles Exiting, veh/h	876	458	211	493
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.5	4.7	9.2	10.3
Approach LOS	A	A	A	B

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Left	Right
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
Assumed Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
RT Channelized			Free			Free				
Lane Util	0.471	0.529		0.469	0.531		0.470	0.530	0.469	0.531
Follow-Up Headway, s	2.667	2.535		2.667	2.535		2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	117	4.645	4.328	668	4.645	4.328	4.645	4.328
Entry Flow, veh/h	121	136	1938	245	277	1938	371	419	220	249
Cap Entry Lane, veh/h	911	987	0.980	643	716	0.980	873	949	626	698
Entry HV Adj Factor	0.980	0.983	115	0.981	0.979	655	0.981	0.980	0.984	0.980
Flow Entry, veh/h	119	134	1900	240	271	1900	364	411	216	244
Cap Entry, veh/h	892	970	0.061	631	700	0.345	856	930	616	684
V/C Ratio	0.133	0.138	0.0	0.381	0.387	0.0	0.425	0.441	0.351	0.357
Control Delay, s/veh	5.3	5.0	A	11.1	10.3	A	9.4	9.1	10.7	9.9
LOS	A	A	0	B	B	2	A	A	B	A
95th %tile Queue, veh	0	0		2	2		2	2	2	2

Intersection	
Intersection Delay, s/veh	21.4
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1107	772	656	1287
Demand Flow Rate, veh/h	1129	787	669	1313
Vehicles Circulating, veh/h	1289	743	1310	622
Vehicles Exiting, veh/h	646	1236	649	517
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	19.9	4.2	35.3	26.1
Approach LOS	C	A	E	D

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Left	Right
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
Assumed Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
RT Channelized			Free			Free				
Lane Util	0.470	0.530		0.470	0.530		0.469	0.531	0.470	0.530
Follow-Up Headway, s	2.667	2.535		2.667	2.535		2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	459	4.645	4.328	391	4.645	4.328	4.645	4.328
Entry Flow, veh/h	315	355	1938	186	210	1938	314	355	617	696
Cap Entry Lane, veh/h	412	475	0.980	681	755	0.980	405	466	762	837
Entry HV Adj Factor	0.980	0.981	450	0.982	0.981	383	0.982	0.979	0.980	0.980
Flow Entry, veh/h	309	348	1900	183	206	1900	308	348	605	682
Cap Entry, veh/h	404	466	0.237	669	740	0.202	397	457	747	820
V/C Ratio	0.764	0.748	0.0	0.273	0.278	0.0	0.776	0.761	0.810	0.832
Control Delay, s/veh	36.3	31.0	A	8.8	8.1	A	38.1	32.7	26.0	26.1
LOS	E	D	1	A	A	1	E	D	D	D
95th %tile Queue, veh	6	6		1	1		7	6	9	10

Intersection	
Intersection Delay, s/veh	17.1
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	530	1684	1116	665
Demand Flow Rate, veh/h	540	1717	1138	679
Vehicles Circulating, veh/h	618	1164	684	1203
Vehicles Exiting, veh/h	1264	658	305	713
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.9	13.6	21.8	27.9
Approach LOS	A	B	C	D

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Left	Right
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
Assumed Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
RT Channelized			Free			Free				
Lane Util	0.469	0.531		0.469	0.531		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535		2.667	2.535		2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	169	4.645	4.328	965	4.645	4.328	4.645	4.328
Entry Flow, veh/h	174	197	1938	353	399	1938	535	603	319	360
Cap Entry Lane, veh/h	765	840	0.980	463	528	0.980	719	794	446	511
Entry HV Adj Factor	0.982	0.978	166	0.982	0.980	946	0.980	0.981	0.980	0.980
Flow Entry, veh/h	171	193	1900	347	391	1900	524	591	313	353
Cap Entry, veh/h	751	821	0.087	454	517	0.498	705	779	438	500
V/C Ratio	0.228	0.235	0.0	0.763	0.756	0.0	0.744	0.760	0.715	0.705
Control Delay, s/veh	7.3	6.9	A	33.0	29.2	A	22.1	21.5	29.9	26.1
LOS	A	A	0	D	D	3	C	C	D	D
95th %tile Queue, veh	1	1		7	7		7	7	6	6

Intersection	
Intersection Delay, s/veh	232.7
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1597	1112	945	1858
Demand Flow Rate, veh/h	1629	1134	963	1895
Vehicles Circulating, veh/h	1861	1070	1890	898
Vehicles Exiting, veh/h	932	1783	938	744
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	243.7	8.6	428.6	257.7
Approach LOS	F	A	F	F

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Left	Right
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
Assumed Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
RT Channelized			Free			Free				
Lane Util	0.469	0.531		0.470	0.530		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535		2.667	2.535		2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	662	4.645	4.328	562	4.645	4.328	4.645	4.328
Entry Flow, veh/h	454	513	1938	269	303	1938	453	510	891	1004
Cap Entry Lane, veh/h	244	292	0.980	504	572	0.980	237	285	591	662
Entry HV Adj Factor	0.982	0.980	649	0.980	0.982	551	0.980	0.982	0.980	0.981
Flow Entry, veh/h	446	503	1900	264	297	1900	444	501	873	985
Cap Entry, veh/h	239	286	0.342	495	561	0.290	233	280	579	649
V/C Ratio	1.863	1.757	0.0	0.533	0.530	0.0	1.909	1.791	1.508	1.517
Control Delay, s/veh	438.6	385.5	A	18.0	16.1	A	459.9	400.8	256.9	258.4
LOS	F	F	2	C	C	1	F	F	F	F
95th %tile Queue, veh	31	33		3	3		32	33	44	49

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	382	1171	896	487
Demand Flow Rate, veh/h	390	1195	914	496
Vehicles Circulating, veh/h	460	918	474	882
Vehicles Exiting, veh/h	918	470	243	563
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.5	5.5	10.5	11.4
Approach LOS	A	A	B	B

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Left	Right
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
Assumed Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
RT Channelized			Free			Free				
Lane Util	0.471	0.529		0.471	0.529		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535		2.667	2.535		2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	133	4.645	4.328	668	4.645	4.328	4.645	4.328
Entry Flow, veh/h	121	136	1938	248	279	1938	430	484	233	263
Cap Entry Lane, veh/h	884	960	0.980	580	651	0.980	873	949	600	671
Entry HV Adj Factor	0.980	0.983	130	0.979	0.981	655	0.980	0.981	0.982	0.981
Flow Entry, veh/h	119	134	1900	243	274	1900	421	475	229	258
Cap Entry, veh/h	866	944	0.068	568	638	0.345	855	931	589	658
V/C Ratio	0.137	0.142	0.0	0.427	0.429	0.0	0.493	0.510	0.389	0.392
Control Delay, s/veh	5.5	5.1	A	13.1	11.9	A	10.7	10.4	11.9	10.9
LOS	A	A	0	B	B	2	B	B	B	B
95th %tile Queue, veh	0	0		2	2		3	3	2	2

Intersection	
Intersection Delay, s/veh	29.1
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1152	786	740	1362
Demand Flow Rate, veh/h	1175	802	755	1390
Vehicles Circulating, veh/h	1381	819	1310	666
Vehicles Exiting, veh/h	675	1246	741	564
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	24.5	4.8	47.6	36.8
Approach LOS	C	A	E	E

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Left	Right
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
Assumed Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
RT Channelized			Free			Free				
Lane Util	0.470	0.530		0.470	0.530		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535		2.667	2.535		2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	505	4.645	4.328	391	4.645	4.328	4.645	4.328
Entry Flow, veh/h	315	355	1938	193	218	1938	355	400	653	737
Cap Entry Lane, veh/h	379	439	0.980	635	708	0.980	405	466	732	806
Entry HV Adj Factor	0.980	0.981	495	0.980	0.979	383	0.980	0.980	0.980	0.980
Flow Entry, veh/h	309	348	1900	189	213	1900	348	392	640	722
Cap Entry, veh/h	371	430	0.261	623	693	0.202	396	457	717	790
V/C Ratio	0.831	0.809	0.0	0.304	0.308	0.0	0.878	0.858	0.893	0.914
Control Delay, s/veh	47.1	39.3	A	9.8	9.0	A	51.9	43.9	36.3	37.2
LOS	E	E	1	A	A	1	F	E	E	E
95th %tile Queue, veh	8	7		1	1		9	9	11	13

Intersection	
Intersection Delay, s/veh	22.5
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	546	1689	1238	691
Demand Flow Rate, veh/h	557	1723	1264	705
Vehicles Circulating, veh/h	649	1277	684	1251
Vehicles Exiting, veh/h	1307	671	336	783
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.9	19.1	28.5	33.9
Approach LOS	A	C	D	D

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Left	Right
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
Assumed Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
RT Channelized			Free			Free				
Lane Util	0.469	0.531		0.470	0.530		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535		2.667	2.535		2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	186	4.645	4.328	965	4.645	4.328	4.645	4.328
Entry Flow, veh/h	174	197	1938	356	402	1938	594	670	331	374
Cap Entry Lane, veh/h	743	818	0.980	417	480	0.980	719	794	427	490
Entry HV Adj Factor	0.982	0.978	182	0.980	0.979	946	0.980	0.980	0.981	0.979
Flow Entry, veh/h	171	193	1900	349	394	1900	582	656	325	366
Cap Entry, veh/h	730	800	0.096	409	470	0.498	705	778	419	480
V/C Ratio	0.234	0.241	0.0	0.854	0.838	0.0	0.826	0.844	0.775	0.763
Control Delay, s/veh	7.6	7.1	A	47.0	40.4	A	28.6	28.4	36.4	31.6
LOS	A	A	0	E	E	3	D	D	E	D
95th %tile Queue, veh	1	1		8	8		9	10	7	7

Intersection	
Intersection Delay, s/veh	277.4
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1641	1127	1030	1933
Demand Flow Rate, veh/h	1674	1150	1050	1972
Vehicles Circulating, veh/h	1954	1147	1890	943
Vehicles Exiting, veh/h	961	1793	1031	792
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	278.1	10.2	501.5	313.0
Approach LOS	F	B	F	F

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Left	Right
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
Assumed Moves	LT	TR	R	LT	TR	R	LT	TR	LT	TR
RT Channelized			Free			Free				
Lane Util	0.469	0.531		0.469	0.531		0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535		2.667	2.535		2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	707	4.645	4.328	562	4.645	4.328	4.645	4.328
Entry Flow, veh/h	454	513	1938	276	312	1938	494	556	927	1045
Cap Entry Lane, veh/h	224	270	0.980	470	536	0.980	237	285	567	637
Entry HV Adj Factor	0.982	0.980	693	0.981	0.979	551	0.980	0.982	0.980	0.981
Flow Entry, veh/h	446	503	1900	271	305	1900	484	546	909	1025
Cap Entry, veh/h	220	264	0.365	461	524	0.290	232	280	556	625
V/C Ratio	2.029	1.902	0.0	0.587	0.583	0.0	2.082	1.952	1.635	1.640
Control Delay, s/veh	515.0	451.5	A	21.3	18.9	A	535.6	471.4	313.0	313.0
LOS	F	F	2	C	C	1	F	F	F	F
95th %tile Queue, veh	33	35		4	4		36	39	51	57