TRAFFIC IMPACT STUDY

For

Buffalo Run Village Center, Amendment No. 2
Commerce City, Colorado

July 2025

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I. Introduction

Project Overview

This traffic impact study is provided as a planning document and addresses the capacity, geometric, and control requirements associated with the development entitled Buffalo Run Village Center, Amendment No. 2. The intent of this traffic impact study is to provide an update to the previously approved Villages at Buffalo Run West (Commercial) Traffic Impact Study[1] with new land use assumptions currently being proposed.

This proposed residential development consists of a multifamily residential community. The development is located near the southeast corner of E 120th Avenue and Chambers Road in Commerce City, Colorado.

Study Area Boundaries

The study area to be examined in this analysis encompasses E 120th Avenue south to E 119th Avenue from Chambers Road east to Jasper Street.

Figure 1 illustrates location of the site and study intersections.

Site Description

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

The proposed development is understood to entail the new construction of 104 townhomes.

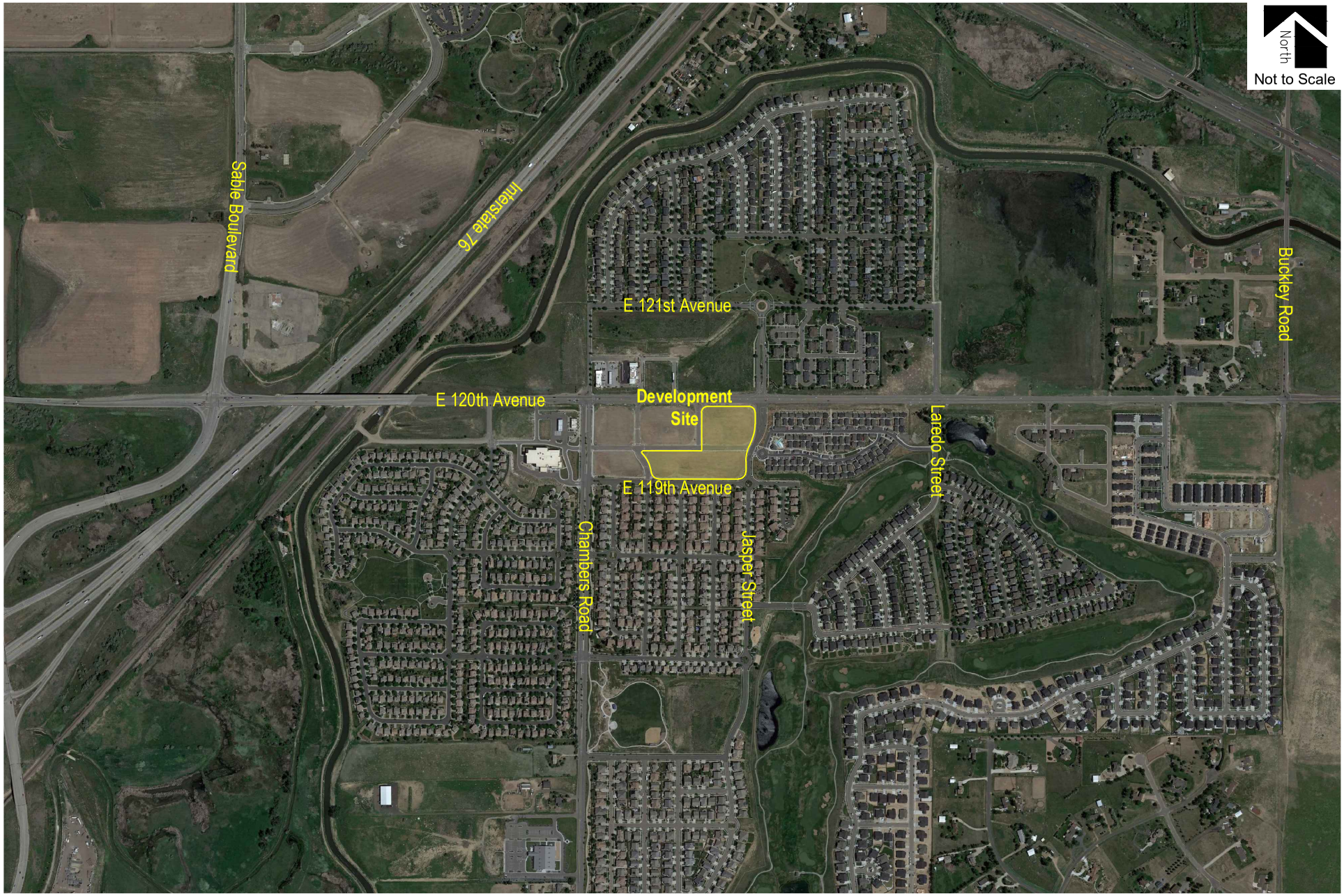
Existing access to the overall development area is provided at the following locations: two right-in/right-out access drives along E 120th Avenue, one full-movement access along Jasper Street, one full-movement access along E 119th Avenue, and one right-in/right-out access along Chambers Road.

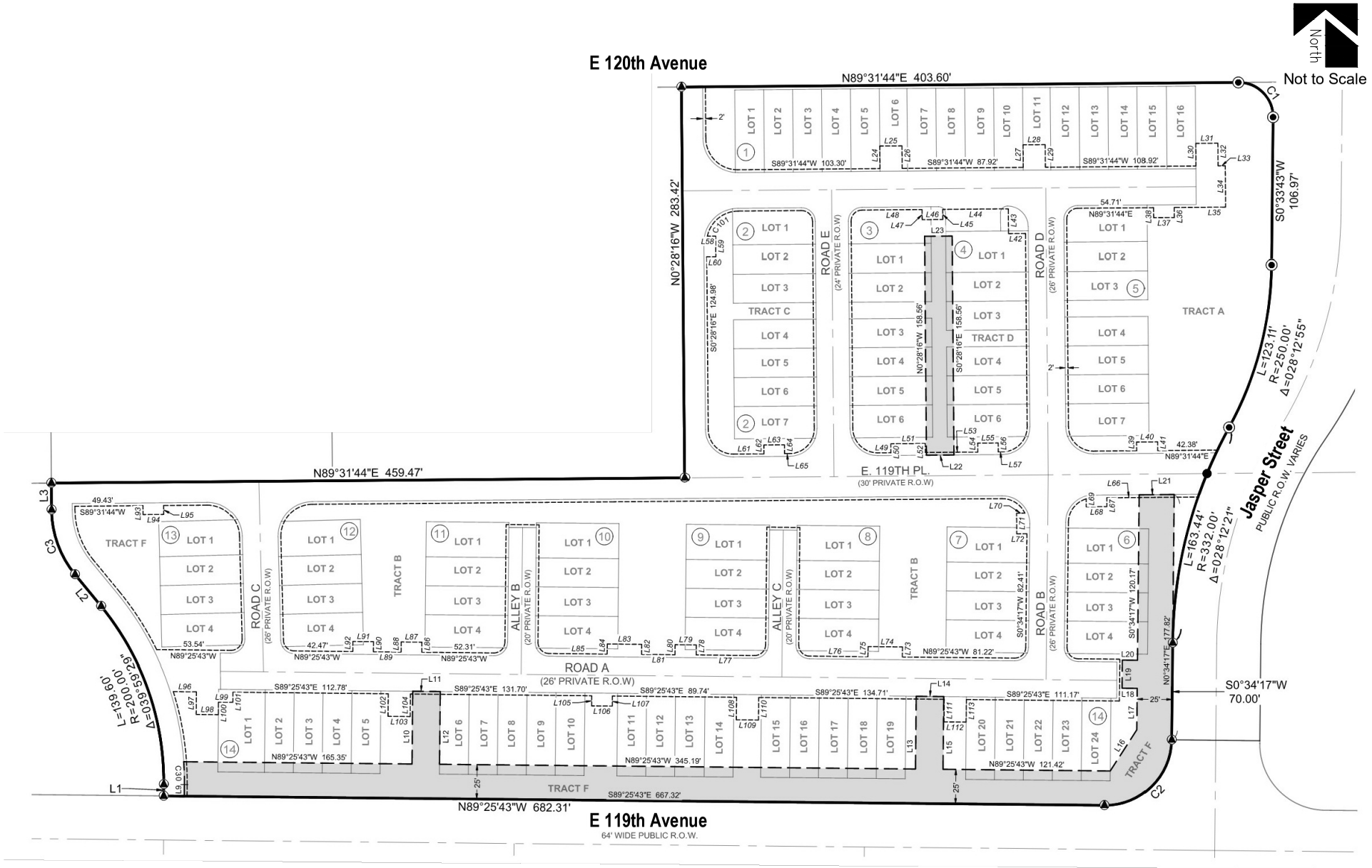
For purposes of this study, it is anticipated that development construction would be completed by end of Year 2027.

General site and access locations are shown on Figure 1.

A site plan, as prepared by CORE Consultants, Inc., is shown on Figure 2. This plan is provided for illustrative purposes only.

[1] Villages at Buffalo Run West (Commercial): Traffic Impact Study, SM ROCHA, LLC, November 2016.


North
Not to Scale
Sable Boulevard
Interstate 76
E 121st Avenue
Buckley Road
E 120th Avenue
Development Site
Laredo Street
E 119th Avenue
Chambers Road
Jasper Street


E 120th Avenue
N89°31'44"E 403.60'
North
Not to Scale
N0°28'16"W 283.42'
S0°33'43"W 106.97'
L=123.11'
R=250.00'
Δ=028°12'55"
Jasper Street
PUBLIC R.O.W. VARIES
N89°31'44"E 459.47'
E. 119TH PL.
(30' PRIVATE R.O.W)
ROAD A
(26' PRIVATE R.O.W)
ROAD B
ROAD C
ROAD D
ROAD E
ALLEY B
ALLEY C
TRACT A
TRACT B
TRACT C
TRACT D
TRACT F
L=163.44'
R=332.00'
Δ=028°12'21"
S0°34'17"W 70.00'
L=39.29'
R=25.00'
Δ=090°00'00"
N89°25'43"W 682.31'
S89°25'43"E 667.32'
E 119th Avenue
64' WIDE PUBLIC R.O.W.

Existing and Committed Surface Transportation Network

Within the study area, E 120th Avenue is the primary roadway that will accommodate traffic to and from the proposed development. Secondary roadways include E 119th Avenue, Chambers Road, and Jasper Street. A brief description of each roadway, based on the City's C3 Vision Transportation Plan[2] and the City of Commerce City Engineering Construction Standards and Specifications[3], is provided below:

> E 120th Avenue is an east-west principal arterial roadway. Within the study area, E 120th Avenue provides three through lanes (two lanes eastbound and one lane westbound) with a combination of shared and exclusive turn lanes at the intersections within the study area. E 120th Avenue provides a posted speed limit of 45 MPH.
>
> E 119th Avenue is an east-west minor/residential collector roadway having two through lanes (one lane in each direction) with shared turn lanes at the intersections within the study area. E 119th Avenue begins at Chambers Road and extends approximately 350 feet east of Jasper Street, providing a posted speed limit of 25 MPH.
>
> Chambers Road is a north-south roadway supporting a combination of shared and exclusive turn lanes at the intersections within the study area. South of E 120th Avenue, Chambers Road is classified as a minor arterial roadway and provides four through lanes (two lanes in each direction) with a posted speed limit of 40 MPH. North of E 120th Avenue, Chambers Road is unclassified while providing two through lanes (one lane in each direction). Per Sections 15.0 and 16.0 of the City's Standards and Specifications, the roadway's estimated right-of-way (ROW) width, and connection to E 120th Avenue, Chambers Road is assumed to be classified as a major collector roadway north of E 120th Avenue with a posted speed limit of 35 MPH
>
> Jasper Street is a north-south minor/residential collector roadway having two through lanes (one lane in each direction) with a combination of shared and exclusive turn lanes at the intersections within the study area. Jasper Street provides a posted speed limit of 25 MPH.

The study intersection of E 120th Avenue with Chambers Road is signalized. The E 119th Avenue intersection with Jasper Street operates as a roundabout. 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.

The Denver Regional Council of Governments' (DRCOG) 2050 Metro Vision Regional Transportation Plan (RTP)[4] shows E 120th Avenue widening from two to four through lanes, regionally funded and implemented by the year 2029.

[2] C3 Vision Transportation Plan, Felsburg Holt & Ullevig, July 2010.
[3] Engineering Construction Standards and Specifications, City of Commerce City, October 2021.
[4] 2050 Metro Vision Regional Transportation Plan, Denver Regional Council of Government, May 2024.

In coordination with City Staff and in order to be consistent with timelines defined within DRCOG's 2050 RTP, it is understood that the study area of E 120th Avenue is currently within a design stage for roadway widening that includes three eastbound through lanes and two westbound through lanes with associated exclusive turn lanes. This improvement is assumed to be implemented by Year 2027.

No regional or specific improvements for Chambers Road, E 119th Avenue, nor Jasper Street are known to be planned or committed at this time.

II. Existing Traffic Conditions

Morning (AM) and afternoon (PM) peak hour traffic counts were collected at the intersections of E 120th Avenue with Jasper Street and Chambers Road as well as the E 119th Avenue intersections with Jasper Street and Chambers Road. Average daily traffic (ADT) volumes were collected over a 24-hour period on Chambers Road. Counts were collected on Tuesday, June 3, 2025, with AM peak hour counts being collected during the period of 7:00 a.m. to 9:00 a.m. and PM peak hour counts being collected during the period of 4:00 p.m. to 6:00 p.m.

Existing volumes and intersection geometry are shown in Figure 3. Traffic count data is included for reference in Appendix A.

Existing signal timing parameters for E 120th Avenue and Chambers Road were assumed based on the existing signal head configuration and allowable movements. Timings were used throughout this study to the best extent possible in order to remain consistent with typical City signal coordination plans.

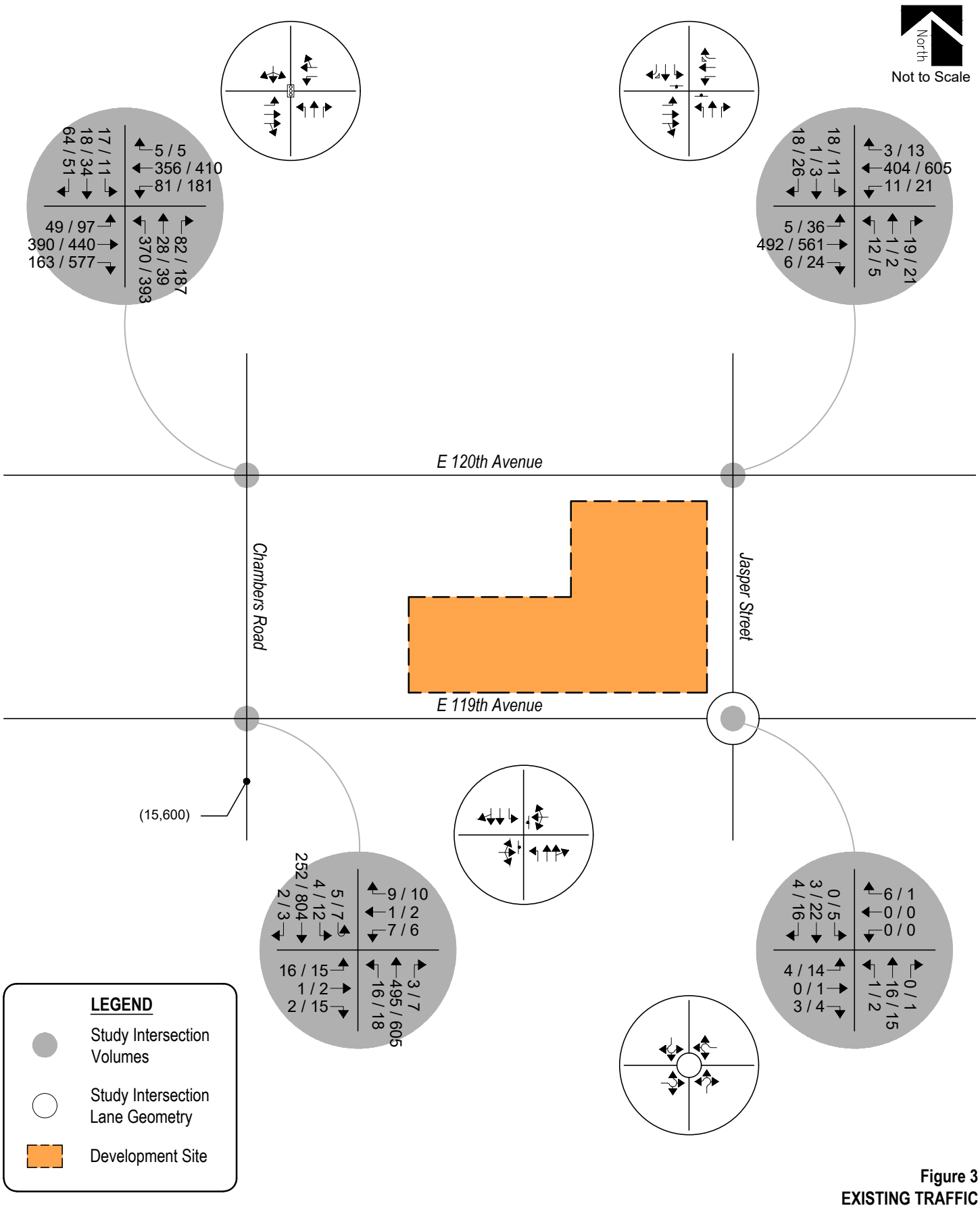


Figure 3
EXISTING TRAFFIC
Volumes & Intersection Geometry
AM / PM Peak Hour
(ADT) : Average Daily Traffic

Peak Hour Intersection Levels of Service – Existing Traffic

The Signalized, Unsignalized, and Roundabout Intersection Analysis techniques, as published in the Highway Capacity Manual (HCM), 7th Edition, by the Transportation Research Board and as incorporated into the SYNCHRO computer program, were used to analyze the study intersections for existing and future 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 and based on the volume to capacity ratio and control delay for each approach.

Pursuant to Section 5.02.1.G of the City of Commerce City Engineering Construction Standards and Specifications, the design objective or each scenario of this study shall be level of service "D". 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	LEVEL OF SERVICE	
LANE GROUPS	AM PEAK HOUR	PM PEAK HOUR
E 120th Avenue / Chambers Road (Signalized)	C (22.9)	C (25.8)
E 120th Avenue / Jasper Street (Stop-Controlled)		
Eastbound Left	A	A
Westbound Left	A	A
Northbound Left	C	E
Northbound Through	C	D
Northbound Right	B	B
Southbound Left	C	D
Southbound Through	C	D
E 119th Avenue / Jasper Street (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left, Through and Right	A	A
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	A
E 119th Avenue / Chambers Road (Stop-Controlled)		
Eastbound Left, Through and Right	B	C
Westbound Left, Through and Right	B	C
Northbound Left	A	A
Southbound Left	A	B

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

Existing Traffic Analysis Results

Under existing conditions, operational analysis shows that the signalized intersection of E 120th Avenue and Chambers Road has overall operations at LOS C during the morning and afternoon peak traffic hours.

The stop-controlled intersection of E 120th Avenue with Jasper Street has turning movement operations at or better than LOS C during the morning peak traffic hour and LOS D during the afternoon peak traffic hour. Exceptions include the northbound left turning movement which operates at LOS E during the afternoon peak traffic hour. The LOS E operation is attributed to the through traffic volume along E 120th Avenue and the stop-controlled nature of the intersection.

The roundabout intersection of E 119th Avenue with Jasper Street shows turning movement operations at LOS A during both peak traffic hours.

The stop-controlled intersection of E 119th Avenue with Chambers Road has turning movement operations at or better than LOS B during the morning peak traffic hour and LOS C or better during the afternoon peak traffic hour.

It is to be noted that it is not uncommon for unsignalized movements to or from an arterial roadway, in urban areas, to operate with noticeable delays during peak traffic hours. It is, however, likely that turn movements will operate better than the results obtained with this HCM Two Way Stop Control (TWSC) level of service analysis would indicate, as the HCM analysis may not accurately account for the effect of vehicle platooning and gaps caused by upstream signals. Upstream signal controls along E 120th Avenue may create additional gaps in the traffic stream for turning movements at Jasper Street which may provide mitigation to the LOS E operation projected during the afternoon peak traffic hour.

Existing Traffic Auxiliary Lane Analysis

Auxiliary lanes for the study area intersections, using existing traffic volumes, are to be based on the City's Standards and Specifications.

An evaluation of auxiliary lane requirements, pursuant to Section 3.04.1.1, Tables 3-6 and 3-7 of the City's Standards and Specifications, reveals that eastbound right turn deceleration lanes along E 120th Avenue at Chambers Road and Jasper Street are already required since existing right turn volumes exceed the City's peak hour volume thresholds.

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 Years 2027 and 2045, a compounded annual growth rate was determined using historical traffic data for the surrounding area provided by the Denver Regional Council of Governments' (DRCOG) Regional Traffic Count Program along the adjacent segment of E 120th Avenue which shows average historical growth rates between one and three percent. Therefore, in order to provide for a conservative analysis, a growth rate of three percent was applied to existing traffic volumes. This annual growth rate is also consistent with regional growth projections and the level of in-fill development expected within the area.

To account for projected traffic from adjacent developments not yet built, trip generations from the 120th & Chambers Ziggi's Coffee Traffic Generation Analysis[5] and the previously approved Villages at Buffalo Run West (Commercial) Traffic Impact Study were added to Year 2027 and Year 2045 background traffic volumes.

In coordination with City Staff, it is understood that there are no current plans to develop Lots 1, 2, or 3 within Buffalo Run Village Center. Therefore, in order to provide for a conservative analysis, trip generations for Lots 1, 2, 3, and 6 as described within the overall Buffalo Run Village Center Transportation Impact Study[6] were only added to Year 2045 background traffic volumes.

The conservative three percent annual growth rate applied to existing traffic volumes, as mentioned above, is expected to account for any additional future developments within the overall area not directly applied to background traffic volumes.

[5] 120th & Chambers Ziggi's Coffee: Traffic Generation Analysis, SM ROCHA, LLC, March 2021.
[6] Buffalo Run Village Center: Transportation Impact Study, Felsburg Holt & Ullevig, September 2007.

Background Traffic Signal Warrants

A signal warrant analysis, using Year 2027 and 2045 background traffic volumes, was conducted for the E 120th Avenue and Jasper Street intersection in order to review potential for traffic signal control.

From a traffic volume perspective, Year 2027 analysis results conclude that the E 120th Avenue and Jasper Street intersection was found to be below the minimum vehicle volumes required to meet Warrant 1 (Eight-Hour Vehicular Volume), Warrant 2 (Four-Hour Vehicular Volume), and Warrant 3 (Peak Hour), from the MUTCD, for the installation of a traffic signal. As such, the intersection remained under stop-controlled conditions by Year 2027.

By Year 2045 and with the addition of trip generations from future adjacent developments, the E 120th Avenue and Jasper Street intersection was found to remain below the minimum vehicle volumes required to meet Warrants 2 and 3 but was above the minimum vehicle volumes required to meet Warrant 1 for the installation of a traffic signal. However, the City's Standards and Specifications do not allow full-movement, signalized intersections spaced less than one-half mile apart along principal arterial roadways. As such, the intersection was analyzed under both stop-control and traffic signal control conditions by Year 2045. Warrant study worksheets are provided for reference in Appendix D.

Said intersection should be monitored further by City Staff as area development occurs to determine when or if signalization installation is appropriate.

Pursuant to the non-committed/proposed and committed area roadway improvements discussed in Section I, Year 2027 background traffic conditions assumes the widening of E 120th Avenue to three eastbound through lanes and two westbound through lanes. Year 2045 background traffic conditions assume no additional roadway improvements to accommodate regional transportation demands.

Projected background traffic volumes and intersection geometry for Years 2027 and 2045 are shown on Figure 4 and Figure 5, respectively.

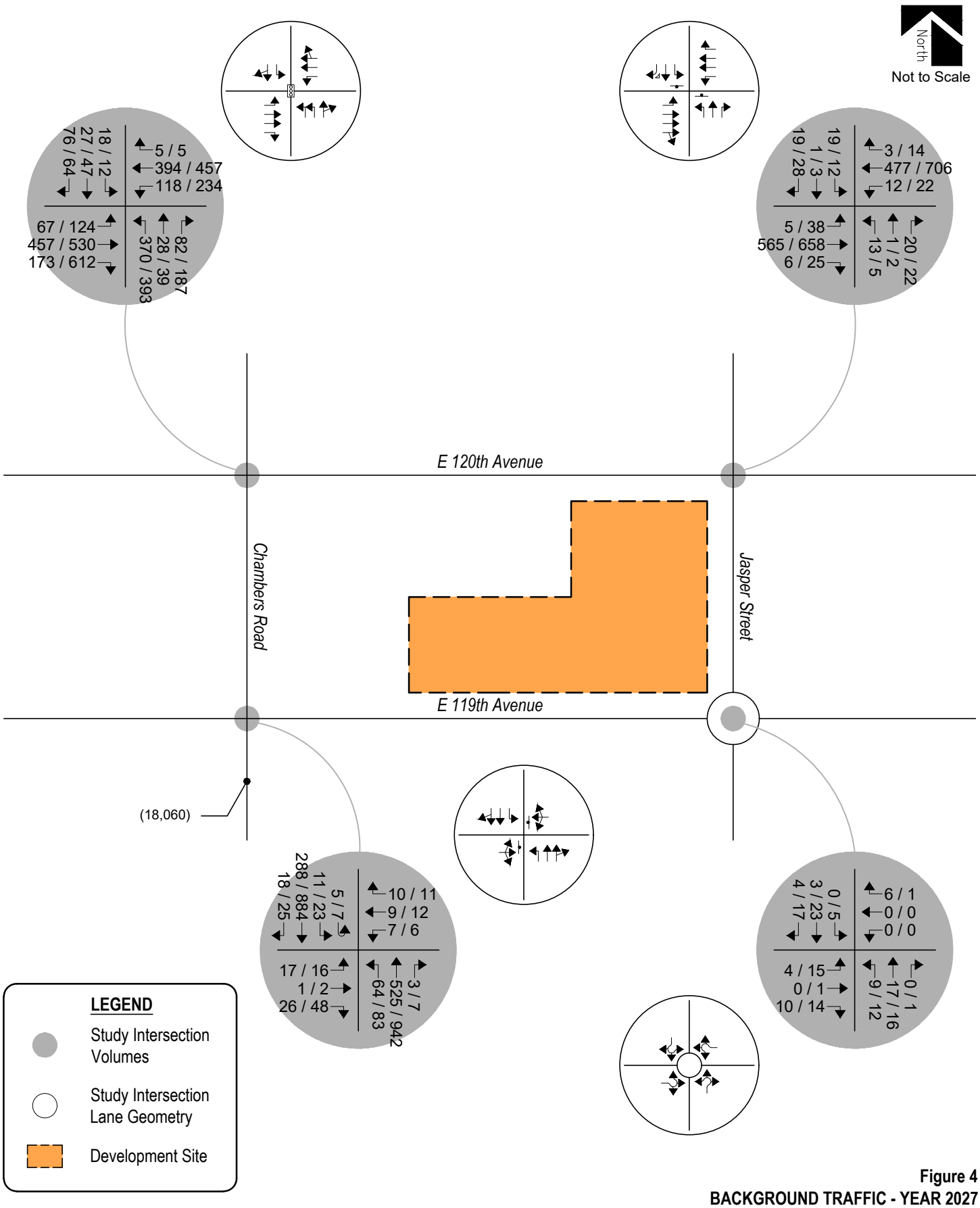


Figure 4
BACKGROUND TRAFFIC - YEAR 2027
Volumes & Intersection Geometry
AM / PM Peak Hour
(ADT) : Average Daily Traffic

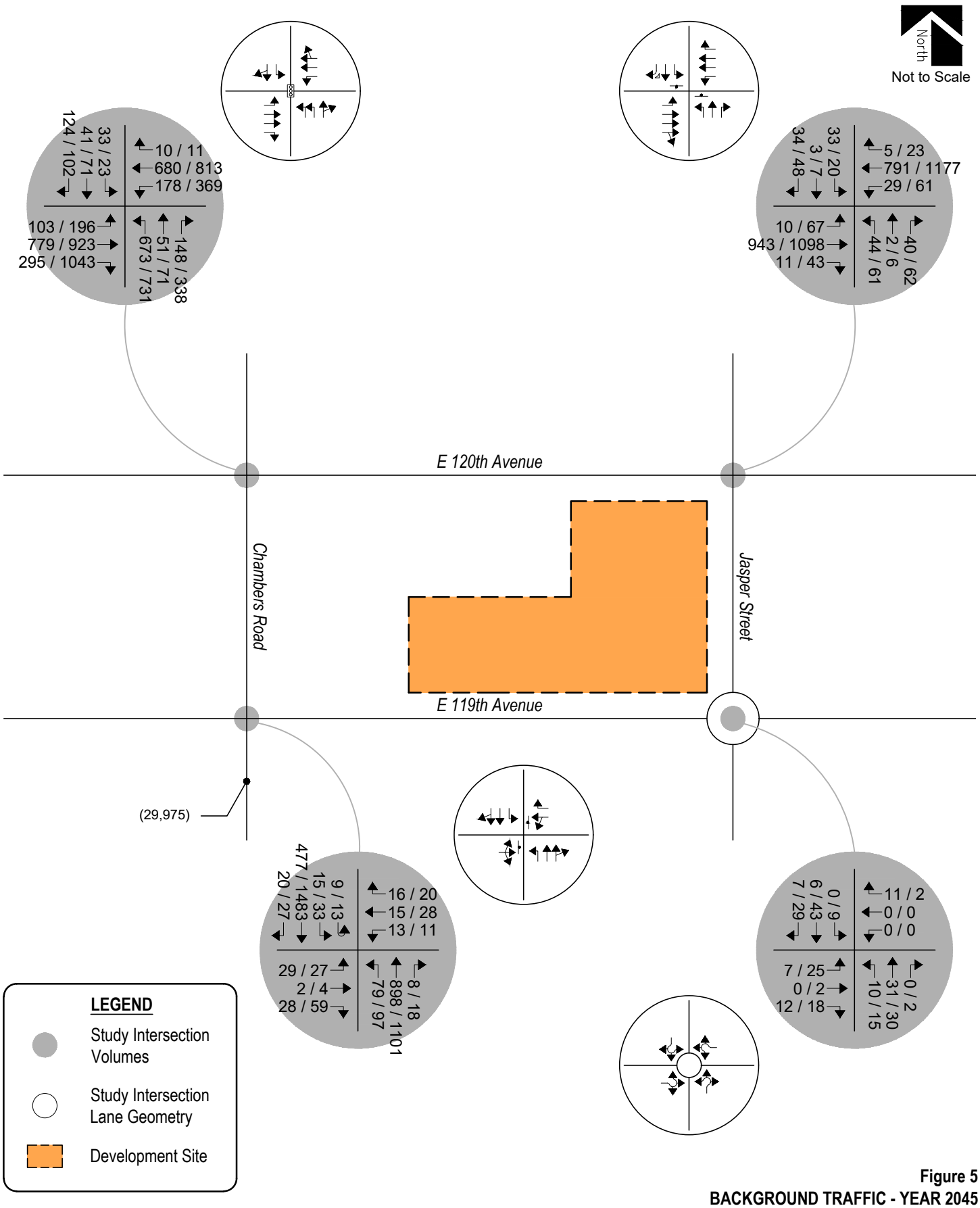


Figure 5
BACKGROUND TRAFFIC - YEAR 2045
Volumes & Intersection Geometry
AM / PM Peak Hour
(ADT) : Average Daily Traffic

Peak Hour Intersection Levels of Service – Background Traffic

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

Background traffic level of service analysis results for Year 2027 are listed in Table 2. Year 2045 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 2027

INTERSECTION	LEVEL OF SERVICE	
LANE GROUPS	AM PEAK HOUR	PM PEAK HOUR
E 120th Avenue / Chambers Road (Signalized)	B (14.4)	B (15.5)
E 120th Avenue / Jasper Street (Stop-Controlled)		
Eastbound Left	A	A
Westbound Left	B	B
Northbound Left	C	D
Northbound Through	C	E
Northbound Right	B	B
Southbound Left	C	D
Southbound Through	C	E
E 119th Avenue / Jasper Street (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left, Through and Right	A	A
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	A
E 119th Avenue / Chambers Road (Stop-Controlled)		
Eastbound Left, Through and Right	B	F
Westbound Left, Through and Right	C	F
Northbound Left	A	A
Southbound Left	A	B

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

Background Traffic Analysis Results – Year 2027

Upon assumed roadway and intersection improvements along E 120th Avenue, Year 2027 background traffic analysis indicates that the signalized intersection of E 120th Avenue and Chambers Road has overall operations at LOS B during the morning and afternoon peak traffic hours.

The stop-controlled intersection of E 120th Avenue and Jasper Street expects turning movement operations at or better than LOS C during the morning peak traffic hour and LOS D or better during the afternoon peak traffic hour. Exceptions include the northbound and southbound through movements which operate at LOS E during the afternoon peak traffic hour. The LOS E operations are attributed to the through traffic volume along E 120th Avenue and the stop-controlled nature of the intersection.

The roundabout intersection of E 119th Avenue with Jasper Street continues to show turning movement operations at LOS A during both morning and afternoon peak traffic hours.

The stop-controlled intersection of E 119th Avenue with Chambers Road has turning movement operations at or better than LOS C during the morning peak traffic hour and LOS B during the afternoon peak traffic hour. Exceptions include the eastbound and westbound turning movements which operate at LOS F during the afternoon peak traffic hour. The LOS F operations are attributed to the through traffic volume along Chambers Road and the stop-controlled nature of the intersection.

Table 3 – Intersection Capacity Analysis Summary – Background Traffic – Year 2045

INTERSECTION LANE GROUPS	LEVEL OF SERVICE AM PEAK HOUR	 PM PEAK HOUR
E 120th Avenue / Chambers Road (Signalized)	C (22.1)	E (61.1)
E 120th Avenue / Jasper Street (Signalized)	*A (6.8)*	*A (9.2)*
E 120th Avenue / Jasper Street (Stop-Controlled)		
Eastbound Left	A	B
Westbound Left	C	C
Northbound Left	F	F
Northbound Through	F	F
Northbound Right	B	C
Southbound Left	F	F
Southbound Through	F	F
E 119th Avenue / Jasper Street (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left, Through and Right	A	A
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	A
E 119th Avenue / Chambers Road (Stop-Controlled)		
Eastbound Left, Through and Right	D	F
Westbound Left and Through	F	F
Westbound Right	B	B
Northbound Left	A	B
Southbound Left	B	C

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

Background Traffic Analysis Results – Year 2045

By Year 2045 and without the proposed development, the study intersection of E 120th Avenue and Chambers Road experiences LOS C operations during the morning peak traffic hour and LOS E operations during the afternoon peak traffic hour. The LOS E operation anticipated during the afternoon peak traffic period is attributed to the high volume of eastbound right and westbound left turning vehicles. In order to mitigate the projected LOS E operation, construction of dual westbound left turn lanes is a potential solution and would allow for overall LOS D operations during the afternoon peak traffic hour.

The stop-controlled intersection of E 120th Avenue and Jasper Street expects turning movement operations at or better than LOS C during the morning and afternoon peak traffic hours. Exceptions include the northbound and southbound through movements which operate at LOS F during both peak traffic hours. The LOS F operations are attributed to the through traffic volume along E 120th Avenue and the stop-controlled nature of the intersection. In order to provide mitigation to the poor levels of service, signalization is one possible solution. Table 3 shows how overall operations could be improved to LOS A during both peak traffic hours. However, signalization is not recommended due to the lack of intersection spacing compared to spacing requirements defined within the City's Standards and Specifications. Signalization at Laredo Street, east of the study area, may be a more appropriate solution as it appears to meet the City's intersection spacing requirements for signalized intersections.

The roundabout intersection of E 119th Avenue with Jasper Street projects turning movement operations at LOS A during both morning and afternoon peak traffic hours.

The stop-controlled intersection of E 119th Avenue with Chambers Road experiences turning movement operations at or better than LOS D during the morning peak traffic hour and LOS C or better during the afternoon peak traffic hour. Exceptions include the eastbound and westbound turning movements which operate at LOS F during their respective peak traffic hours. The LOS F operations are attributed to the through traffic volume along Chambers Road and the stop-controlled nature of the intersection.

It is to be noted that it is not uncommon for unsignalized movements to or from an arterial roadway, in urban areas, to operate with noticeable delays during peak traffic hours. It is, however, likely that turn movements will operate better than the results obtained with this HCM Two Way Stop Control (TWSC) level of service analysis would indicate, as the HCM analysis may not accurately account for the effect of vehicle platooning and gaps caused by upstream signals. Upstream signal controls may create additional gaps in the traffic stream for turning movements at Jasper Street and at E 119th Avenue which may provide mitigation to the LOS F operations projected during both peak traffic hours.

IV. Proposed Project Traffic

Trip Generation

Standard traffic generation characteristics compiled by the Institute of Transportation Engineers (ITE) in their report entitled Trip Generation Manual, 11th Edition, were applied to the previously approved and proposed land uses 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 previously approved traffic impact study for the Villages at Buffalo Run West (Commercial) development used trip generation rates from ITE's Trip Generation Manual, 7th Edition, and included Day Care, Nursery, Bank, and Fast-Food Restaurant land uses in the same development area as currently proposed with this project.

The ITE land use code 220 (Multifamily Housing (Low-Rise)) was used for estimating trip generation because of its conservative rates and best fit to the proposed land use description.

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

Table 4 – Trip Generation Rates

			TRIP GENERATION RATES						
ITE			24	AM PEAK HOUR			PM PEAK HOUR		
CODE	LAND USE	UNIT	HOUR	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
220	Multifamily Housing (Low-Rise)	DU	6.74	0.10	0.30	0.40	0.32	0.19	0.51

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

Table 5 illustrates projected ADT, AM Peak Hour, and PM Peak Hour traffic volumes likely generated by the proposed development upon build-out and provides comparison to traffic volume estimates of previously approved land uses.

Table 5 – Trip Generation Summary

ITE CODE	LAND USE	SIZE	TOTAL TRIPS GENERATED						
			24 HOUR	AM PEAK HOUR			PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Site Development - Previously Approved *									
565	Day Care	8.0 KSF	634	54	48	102	50	56	106
817	Nursery	3.9 KSF	140	3	2	5	7	8	15
912	Bank	4.0 KSF	986	28	22	50	91	91	182
934	Fast Food Restaurant	4.1 KSF	2,020	112	108	220	74	69	143
	Previously Assumed Total:		*3,780*	*197*	*180*	*377*	*222*	*224*	*446*
Site Development - Proposed									
220	Multifamily Housing (Low-Rise)	104 DU	701	10	32	42	33	20	53
	Proposed Total:		*701*	*10*	*32*	*42*	*33*	*20*	*53*
	Difference Total:		***-3,079***	***-187***	***-148***	***-335***	***-189***	***-204***	***-393***

Key: * = Trip generation rates from ITE's Trip Generation Manual, 7th Edition.
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 701 daily trips with 42 of those occurring during the morning peak hour and 53 during the afternoon peak hour. Table 5 further shows how proposed development traffic volumes do not exceed those previously approved in the Villages at Buffalo Run West (Commercial) Traffic Impact Study.

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 City, proposed and existing area land uses, allowed turning movements, available roadway network, in reference to distribution patterns approved within the Villages at Buffalo Run West (Commercial) Traffic Impact Study, and in reference to historical traffic count data provided by DRCOG's Regional Traffic Count Program.

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.

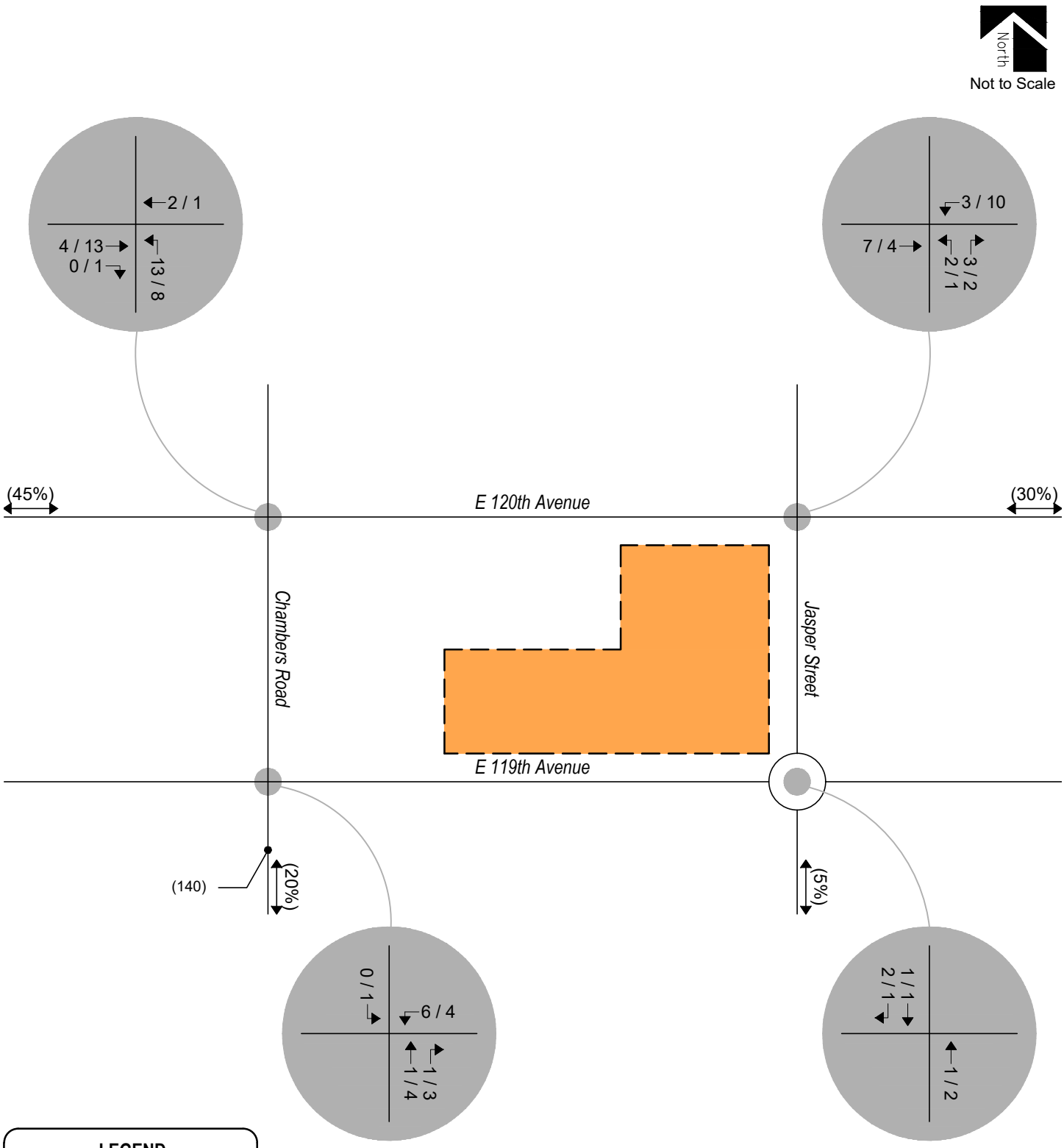


Figure 6
SITE DEVELOPMENT DISTRIBUTION
(%) : Overall
SITE-GENERATED
AM / PM Peak Hour

V. Future Traffic Conditions With Proposed Developments

Total traffic is the traffic projected to be on area roadways with consideration of the proposed development. Total traffic includes background traffic projections for Years 2027 and 2045 with consideration of site-generated traffic. For analysis purposes, it was assumed that development construction would be completed by end of Year 2027.

Pursuant to area roadway improvement discussions provided in Section III, Year 2027 and Year 2045 total traffic conditions assume no additional roadway improvements to accommodate regional transportation demands. Roadway improvements associated with site development are expected to be limited to site access and frontage as required by the governing agency.

Total Traffic Auxiliary Lane Analysis

Auxiliary lanes for site development access drives are to be based on the City's Standards and Specifications.

Considering development build-out, an evaluation of auxiliary lane requirements, pursuant to Section 3.04.1.1, Tables 3-6 and 3-7 of the City's Standards and Specifications, reveals that exclusive left or right turn deceleration lanes into the overall Buffalo Run Village Center development are not expected. While direct access drives for the Buffalo Run Village Center were not analyzed within this study, review of peak hour trips shown in Figure 6 indicate that site-generated trips from the proposed development will not exceed the City's minimum vehicle volume thresholds that would require exclusive turn lanes.

Total Traffic Signal Warrant

A signal warrant analysis, using Year 2027 and 2045 total traffic volumes, was conducted for the E 120th Avenue and Jasper Street intersection in order to review potential for traffic signal control.

From a traffic volume perspective, Year 2027 analysis results conclude that the E 120th Avenue and Jasper Street intersection continues to be below the minimum vehicle volumes required to meet Warrant 1 (Eight-Hour Vehicular Volume), Warrant 2 (Four-Hour Vehicular Volume), and Warrant 3 (Peak Hour), from the MUTCD, for the installation of a traffic signal. As such, the intersection remained under stop-controlled conditions by Year 2027.

By Year 2045 and upon development build-out, the E 120th Avenue and Jasper Street intersection was still found to be below the minimum vehicle volumes required to meet Warrant 2, but was above the minimum vehicle volumes required to meet Warrants 1 and 3 for the installation of a traffic signal. However, the City's Standards and Specifications do not allow full-movement, signalized intersections spaced less than one-half mile apart along principal arterial roadways. As such, the intersection was analyzed under both stop-control and traffic signal control conditions by Year 2045. Warrant study worksheets are provided for reference in Appendix D.

Said intersections should be monitored further by City Staff as area development occurs to determine when or if signalization installation is appropriate.

Projected Year 2027 total traffic volumes and intersection geometry are shown in Figure 7.

Figure 8 shows projected total traffic volumes and intersection geometry for Year 2045.

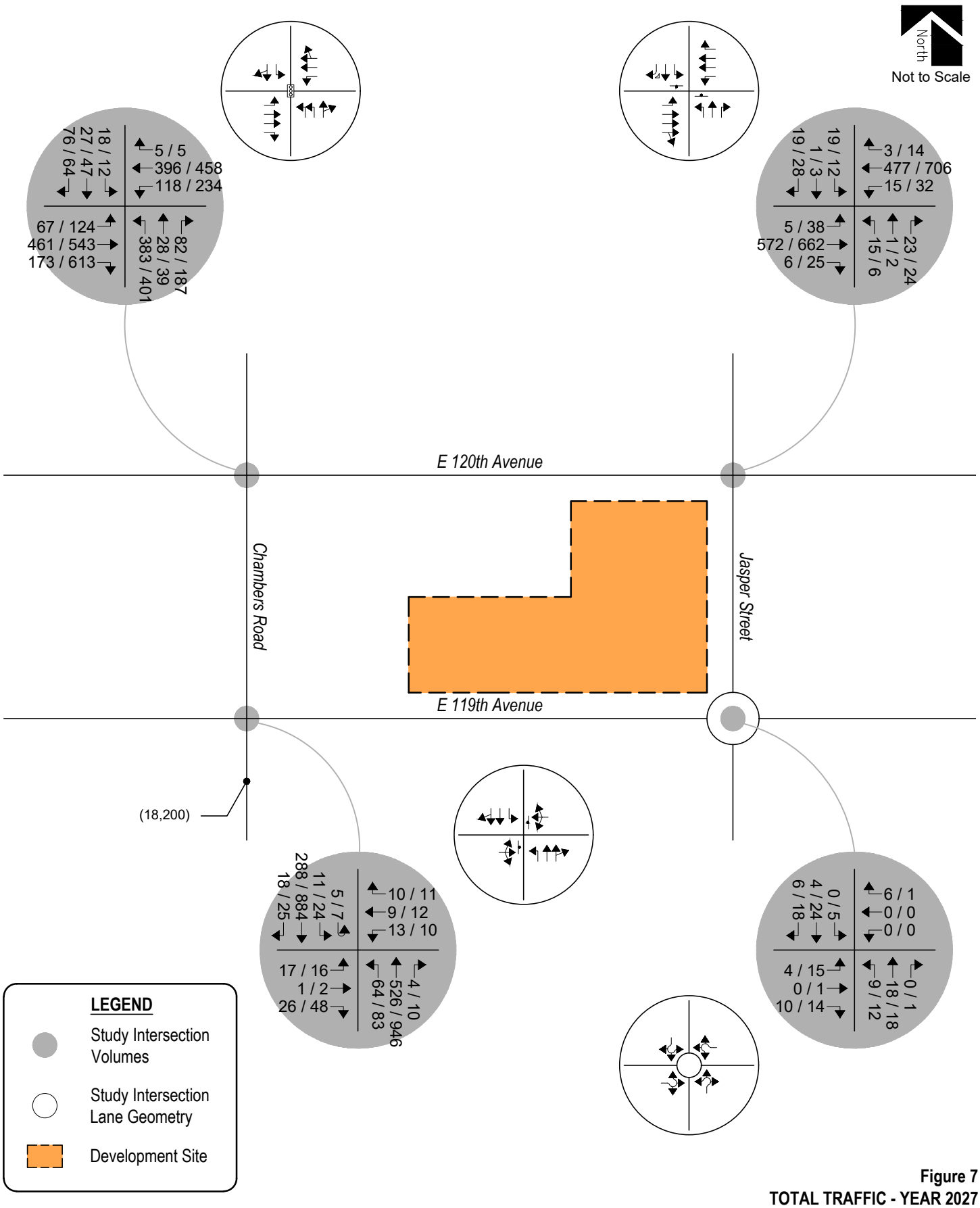


Figure 7
TOTAL TRAFFIC - YEAR 2027
Volumes & Intersection Geometry
AM / PM Peak Hour
(ADT) : Average Daily Traffic

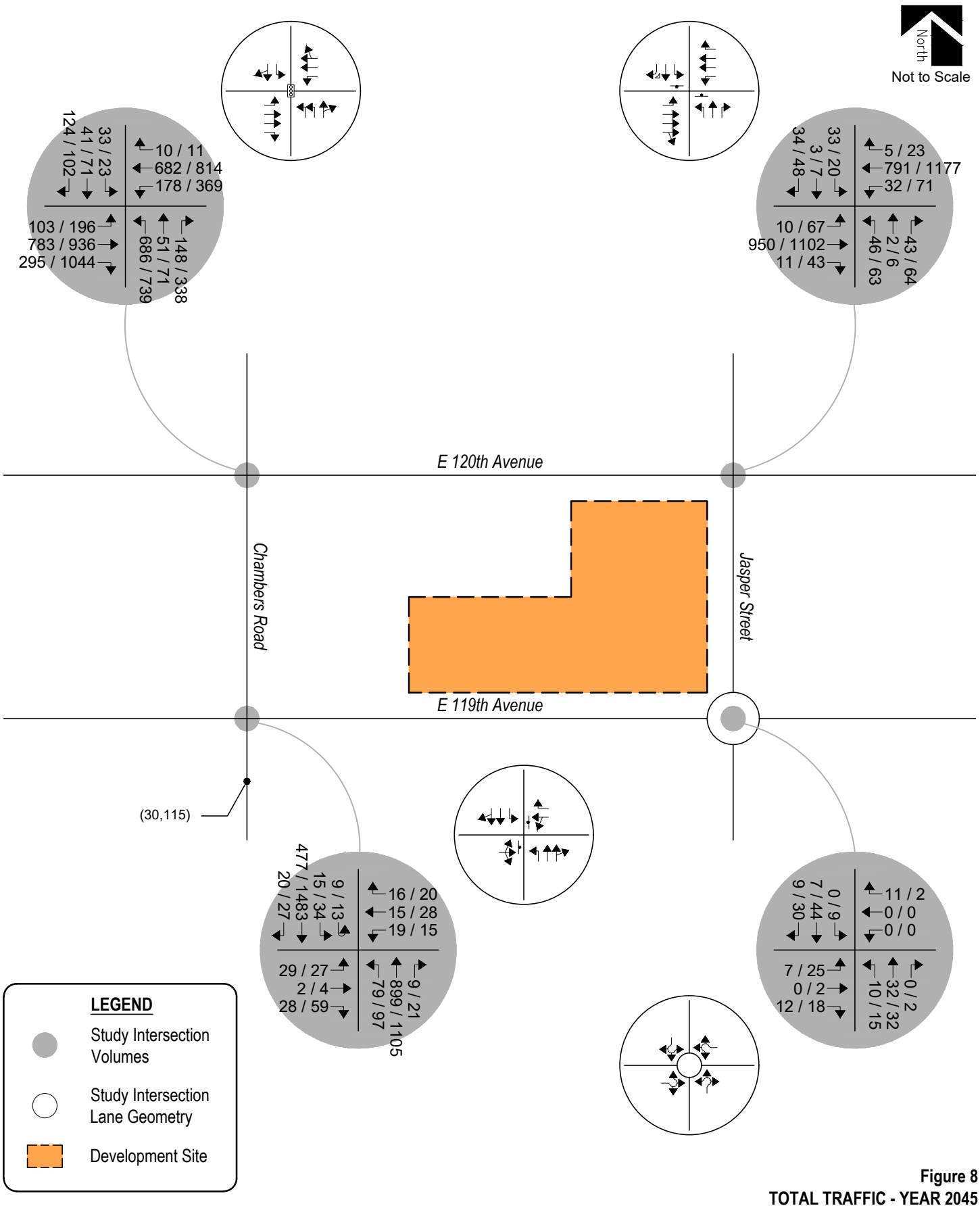


Figure 8
TOTAL TRAFFIC - YEAR 2045
Volumes & Intersection Geometry
AM / PM Peak Hour
(ADT) : Average Daily Traffic

Peak Hour Intersection Levels of Service – Total Traffic

As with background traffic, the operations of the study intersections were analyzed under projected total traffic conditions using the SYNCHRO computer program. The analyses and procedures were performed in accordance with the latest 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.

Total traffic level of service analysis results for Years 2027 and 2045 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 2027

INTERSECTION LANE GROUPS	LEVEL OF SERVICE AM PEAK HOUR	 PM PEAK HOUR
E 120th Avenue / Chambers Road (Signalized)	B (14.5)	B (15.7)
E 120th Avenue / Jasper Street (Stop-Controlled)		
Eastbound Left	A	A
Westbound Left	B	B
Northbound Left	C	D
Northbound Through	D	E
Northbound Right	B	B
Southbound Left	C	D
Southbound Through	D	E
E 119th Avenue / Jasper Street (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left, Through and Right	A	A
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	A
E 119th Avenue / Chambers Road (Stop-Controlled)		
Eastbound Left, Through and Right	B	F
Westbound Left, Through and Right	C	F
Northbound Left	A	A
Southbound Left	A	B

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

Table 7 – Intersection Capacity Analysis Summary – Total Traffic – Year 2045

INTERSECTION LANE GROUPS	LEVEL OF SERVICE AM PEAK HOUR	 PM PEAK HOUR
E 120th Avenue / Chambers Road (Signalized)	C (22.5)	E (62.2)
E 120th Avenue / Jasper Street (Signalized)	*A (6.8)*	*A (9.2)*
E 120th Avenue / Jasper Street (Stop-Controlled)		
Eastbound Left	A	B
Westbound Left	C	C
Northbound Left	F	F
Northbound Through	F	F
Northbound Right	B	C
Southbound Left	F	F
Southbound Through	F	F
E 119th Avenue / Jasper Street (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left, Through and Right	A	A
Northbound Left, Through and Right	A	A
Southbound Left, Through and Right	A	A
E 119th Avenue / Chambers Road (Stop-Controlled)		
Eastbound Left, Through and Right	D	F
Westbound Left and Through	F	F
Westbound Right	B	B
Northbound Left	A	B
Southbound Left	B	C

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

Total Traffic Analysis Results Upon Development Build-Out

Table 7 illustrates how, by Year 2045 and upon development build-out, the signalized intersection of E 120th Avenue with Chambers Road shows an overall LOS C operation during the morning peak traffic hour and an LOS E operation during the afternoon peak traffic hour. The LOS E operation anticipated during the afternoon peak traffic period continues to be attributed to the high volume of eastbound right and westbound left turning vehicles. As discussed in background traffic, in order to mitigate the projected LOS E operation, construction of dual westbound left turn lanes is a potential solution and would allow for overall LOS D operations during the afternoon peak traffic hour.

The stop-controlled intersection of E 120th Avenue and Jasper Street expects turning movement operations at or better than LOS C during the morning and afternoon peak traffic hours. Exceptions include the northbound and southbound left and through movements which operate at LOS F during both peak traffic hours. The LOS F operations are attributed to the through traffic volume along E 120th Avenue and the stop-controlled nature of the intersection. In order to provide mitigation to the poor levels of service, signalization is one possible solution. Table 3 shows how overall operations could be improved to LOS A during both peak traffic hours. However, as previously discussed, signalization is not recommended due to the lack of intersection spacing compared to spacing requirements defined within the City's Standards and Specifications. Signalization at Laredo Street, east of the study area, may be a more appropriate solution as it appears to meet the City's intersection spacing requirements for signalized intersections.

The roundabout intersection of E 119th Avenue with Jasper Street expects turning movement operations at LOS A during both morning and afternoon peak traffic hours.

The stop-controlled intersection of E 119th Avenue with Chambers Road experiences turning movement operations at or better than LOS D during the morning peak traffic hour and LOS C or better during the afternoon peak traffic hour. Exceptions still include the eastbound and westbound turning movements which operate at LOS F during their respective peak traffic hours. The LOS F operations are attributed to the through traffic volume along Chambers Road and the stop-controlled nature of the intersection.

It is to be noted that it is not uncommon for unsignalized movements to or from an arterial roadway, in urban areas, to operate with noticeable delays during peak traffic hours. It is, however, likely that turn movements will operate better than the results obtained with this HCM Two Way Stop Control (TWSC) level of service analysis would indicate, as the HCM analysis may not accurately account for the effect of vehicle platooning and gaps caused by upstream signals. Upstream signal controls may create additional gaps in the traffic stream for turning movements at Jasper Street and at E 119th Avenue which may provide mitigation to the LOS E and F operations projected during both peak traffic hours.

These intersection operations are similar to background conditions.

VI. Project Impacts

It is emphasized that the analyses and procedures described in this study were performed in accordance with the latest 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.

Queue Length Analysis

Queue lengths for the study intersections were analyzed using Year 2045 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. An average vehicle length of 25 feet was assumed. Queue lengths were modeled and are included with the Synchro worksheets in Appendix C.

In general, auxiliary lane lengths are recommended to accommodate the City's minimum turn lane lengths or accommodate long-term 95th percentile vehicle queues, whichever is greater.

Table 8 summarizes the 95th percentile queue results in comparison to the projected storage requirements for turn movements within study area for Year 2045.

Table 8 – Turn Lane Queues and Storage Requirements – Total Traffic – Year 2045

Intersection	Turn Movement		Existing Turn Lane Length (feet)	AM Peak Hour		PM Peak Hour		Recommended Turn Lane Length (feet)
				95th Percentile Queue Length (feet)	Vehicle Equivalent (vehicles)	95th Percentile Queue Length (feet)	Vehicle Equivalent (vehicles)	
Signalized Intersections								
Chambers Road / E 120th Avenue	EB	L	95'	46'	2	100'	4	360'
		T	-	245'	10	319'	13	-
		R	-	28'	2	698'	28	700'
	WB	L	410'	89'	4	271'	11	435'
		T,R	-	186'	8	255'	11	-
	NB	L	190'	158'	7	198'	8	340'
		T,R	-	69'	3	165'	7	-
	SB	L	-	24'	1	19'	1	140'
		T,R	-	85'	4	133'	6	-
E 120th Avenue / Jasper Street	*EB*	*L*	*150'*	*2'*	*1*	*9'*	*1*	*285'*
		T,R	*-*	*93'*	*4*	*85'*	*4*	*-*
	WB	*L*	*220'*	*10'*	*1*	*16'*	*1*	*285'*
		T	*-*	*142'*	*6*	*235'*	*10*	*-*
		R	*120'*	*0'*	*0*	*0'*	*0*	*185'*
	NB	*L*	*55'*	*44'*	*2*	*57'*	*3*	*150'*
		T	*-*	*6'*	*1*	*12'*	*1*	*-*
		R	*165'*	*0'*	*0*	*5'*	*1*	*165'*
	SB	*L*	*75'*	*34'*	*2*	*26'*	*2*	*100'*
		T	*-*	*7'*	*1*	*13'*	*1*	
		R	*-*	*0'*	*0*	*0'*	*0*	*50'*
Stop-Controlled Intersections								
E 120th Avenue / Jasper Street	EB	L	150'	0'	0	13'	1	*235'*
		T,R	-	0'	0	0'	0	-
	WB	L	220'	8'	1	25'	1	285'
		T	-	0'	0	0'	0	-
		R	120'	0'	0	0'	0	185'
	NB	L	55'	70'	3	248'	10	250'
		T	-	3'	1	33'	2	-
		R	165'	10'	1	18'	1	165'
	SB	L	75'	38'	2	88'	4	100'
		T	-	5'	1	38'	2	-
		R	-	0'	0	0'	0	50'
E 119th Avenue / Chambers Road	EB	L,T,R	-	35'	2	0'	0	-
	WB	L,T	-	43'	2	0'	0	-
		R	-	3'	1	5'	1	50'
	NB	L	75'	5'	1	20'	1	190'
		T,R	-	0'	0	0'	0	-
	SB	L	75'	5'	1	10'	1	140'
		T,R	-	0'	0	0'	0	-
Roundabout Intersections								
E 119th Avenue / Jasper Street	EB	L,T,R	-	0'	0	0'	0	-
	WB	L,T,R	-	0'	0	0'	0	-
	NB	L,T,R	-	0'	0	0'	0	-
	SB	L,T,R	-	0'	0	0'	0	-

Note: Turn Lane Length does not include taper length.
x2 = Dual Turn Lanes.

Development Impacts

It is understood that pursuant to Section 5.02.1.G of the City of Commerce City Engineering Construction Standards and Specifications, the design objective or each scenario of this study shall be level of service "D".

By Year 2045, comparison of long-term background traffic operations (Table 3) versus long-term total traffic operations (Table 7) implies that this development creates minimal impact to this study intersection. For example, projected overall delay in the PM peak traffic hour only increases by one second with the addition of site generated traffic.

Similarly, all stop-controlled and roundabout-controlled study intersections show minimal changes in traffic operations from background to total traffic conditions. Comparison of Table 3 and Table 7, as mentioned previously, shows that projected LOS results remain unchanged with the addition of site generated traffic.

It is emphasized that, considering the conservative assumptions applied within this analysis, LOS E and F operations occur without the proposed development. With all conservative assumptions defined in this analysis, the study intersections are projected to operate at future levels of service comparable to Year 2045 background traffic conditions. As such, no improvements associated with the proposed development are being recommended at this time.

VII. Conclusion

This traffic impact study addressed the capacity, geometric, and control requirements associated with the development entitled Buffalo Run Village Center, Amendment No. 2. This proposed residential development consists of a multifamily residential community. The development is located near the southeast corner of E 120th Avenue and Chambers Road in Commerce City, Colorado.

The study area examined in this analysis encompassed E 120th Avenue south to E 119th Avenue from Chambers Road east to Jasper Street.

Analysis was conducted for critical AM Peak Hour and PM Peak Hour traffic operations for existing traffic conditions, Year 2027 and Year 2045 background traffic conditions, and Year 2027 and Year 2045 total traffic conditions.

Analysis of existing traffic conditions indicates that the signalized intersection of E 120th Avenue and Chambers Road has overall operations at LOS C during the morning and afternoon peak traffic hours. The roundabout intersection of E 119th Avenue with Jasper Street shows turning movement operations at LOS A during both peak traffic hours. All stop-controlled study intersections have turning movement operations at or better than LOS C during the morning peak traffic hours and LOS D during the afternoon peak traffic hour. Exceptions include the northbound left turning movement at E 120th Avenue and Jasper Street which operates at LOS E during the afternoon peak traffic hour.

Without the proposed development and upon roadway and intersection improvements assumed along E 120th Avenue, Year 2027 background operational analysis shows that the signalized intersection of E 120th Avenue and Chambers Road has overall operations at LOS B during the morning and afternoon peak traffic hours. The roundabout intersection of E 119th Avenue with Jasper Street shows turning movement operations at LOS A during both peak traffic hours. All stop-controlled study intersections have turning movement operations at or better than LOS C during the morning peak traffic hour and LOS D during the afternoon peak traffic hour. Exceptions include the northbound left turning movement at E 120th Avenue and Jasper Street which operates at LOS E during the afternoon peak traffic hour as well as the eastbound and westbound movements at E 119th Avenue and Chambers Road with operate at LOS F during the afternoon peak traffic hour.

By Year 2045 and without the proposed development, the study intersection of E 120th Avenue and Chambers Road experiences LOS C operations during the morning peak traffic hour and LOS E operations during the afternoon peak traffic hour. The LOS E operation anticipated during the afternoon peak traffic period is attributed to the high volume of eastbound right and westbound left turning vehicles. In order to mitigate the projected LOS E operation, construction of dual westbound left turn lanes is a potential solution and would allow for overall LOS D operations during the afternoon peak traffic hour. The roundabout intersection of E 119th Avenue with Jasper Street shows turning movement operations at LOS A during both peak traffic hours. All stop-controlled study intersections project turning movement operations at or better than LOS D during the morning peak traffic hour and LOS C during the afternoon peak traffic hour. Exceptions include the northbound and southbound left and through movements at E 120th Avenue and Jasper Street which operate at LOS F during their respective peak traffic hours as well as the eastbound and westbound movements at E 119th Avenue and Chambers Road with operate at LOS F during their respective peak traffic hour.

Analysis of future traffic conditions indicates that the addition of site-generated traffic is expected to create minimal negative impact to traffic operations for the existing and surrounding roadway system upon 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 2045 background traffic conditions.

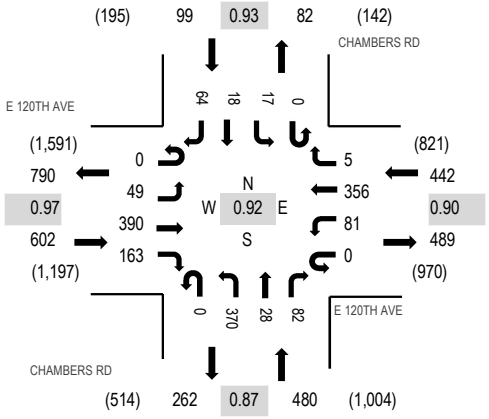
APPENDIX A

Traffic Count Data

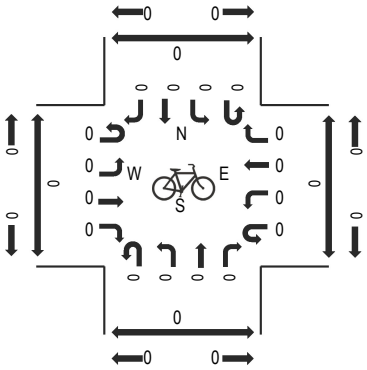
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 CHAMBERS RD & E 120TH AVE AM
Date: Tuesday, June 3, 2025
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 08:30 AM - 08:45 AM

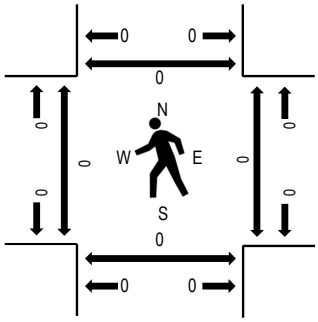
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

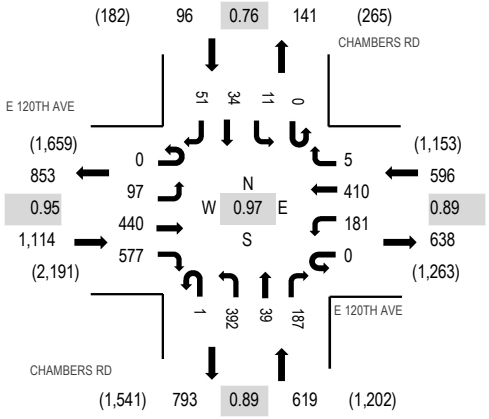
Traffic Counts - Motorized Vehicles

Interval Start Time	E 120TH AVE Eastbound				E 120TH AVE Westbound				CHAMBERS RD Northbound				CHAMBERS 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	6	94	38	0	13	89	0	0	83	7	14	0	6	4	19	373	1,606	0	0	0	0
7:15 AM	0	8	108	40	0	12	95	0	0	115	5	28	0	1	6	23	441	1,614	0	0	0	0
7:30 AM	0	17	81	52	0	13	80	0	0	90	3	29	0	2	4	17	388	1,572	0	0	0	0
7:45 AM	0	15	88	44	0	24	93	0	0	80	5	25	0	4	6	20	404	1,623	0	0	0	0
8:00 AM	0	13	105	39	0	18	89	1	0	73	12	13	0	3	5	10	381	1,611	0	0	0	0
8:15 AM	0	11	93	45	0	20	73	1	0	100	6	22	0	6	2	20	399		0	0	0	0
8:30 AM	0	10	104	35	0	19	101	3	0	117	5	22	0	4	5	14	439		0	0	0	0
8:45 AM	0	9	91	51	0	13	64	0	0	121	5	24	0	3	6	5	392		0	0	0	0
Count Total	0	89	764	344	0	132	684	5	0	779	48	177	0	29	38	128	3,217		0	0	0	0
Peak Hour	0	49	390	163	0	81	356	5	0	370	28	82	0	17	18	64	1,623		0	0	0	0

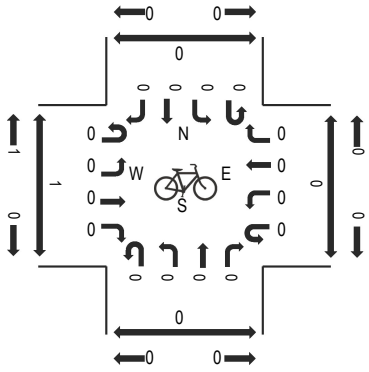
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 CHAMBERS RD & E 120TH AVE PM
Date: Tuesday, June 3, 2025
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

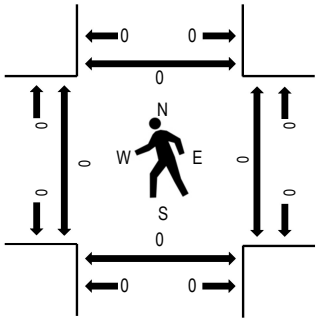
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

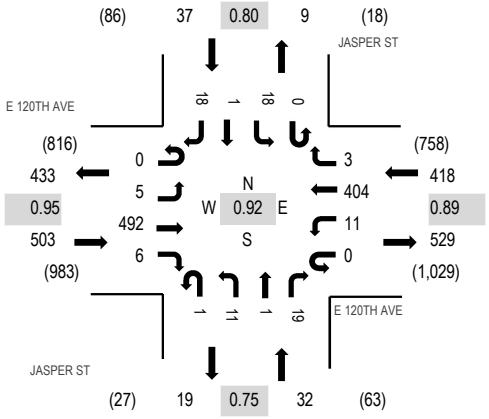
Traffic Counts - Motorized Vehicles

Interval Start Time	E 120TH AVE Eastbound				E 120TH AVE Westbound				CHAMBERS RD Northbound				CHAMBERS 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	24	130	125	0	41	95	2	0	92	5	39	0	3	6	10	572	2,362	0	0	0	0
4:15 PM	0	26	112	141	0	51	122	1	0	73	12	39	0	6	8	11	602	2,416	0	0	0	0
4:30 PM	0	28	115	121	0	45	97	1	0	117	6	41	0	5	11	18	605	2,425	0	0	0	0
4:45 PM	0	14	101	152	0	45	97	2	1	97	11	45	0	3	7	8	583	2,418	0	0	0	0
5:00 PM	0	25	106	158	0	40	115	1	0	90	13	51	0	2	11	14	626	2,366	0	0	0	0
5:15 PM	0	30	118	146	0	51	101	1	0	88	9	50	0	1	5	11	611		0	0	0	0
5:30 PM	0	19	107	147	0	49	76	0	1	130	4	42	0	4	8	11	598		0	0	0	0
5:45 PM	0	15	96	135	0	35	84	1	0	85	15	46	0	1	1	17	531		0	0	0	0
Count Total	0	181	885	1,125	0	357	787	9	2	772	75	353	0	25	57	100	4,728		0	0	0	0
Peak Hour	0	97	440	577	0	181	410	5	1	392	39	187	0	11	34	51	2,425		0	0	0	0

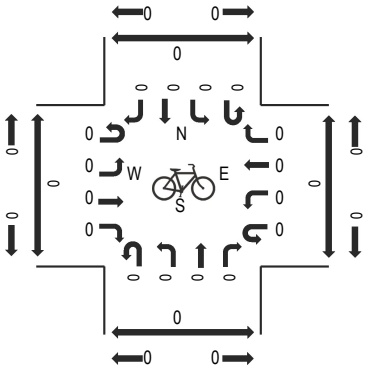
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 2 JASPER ST & E 120TH AVE AM
Date: Tuesday, June 3, 2025
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 08:30 AM - 08:45 AM

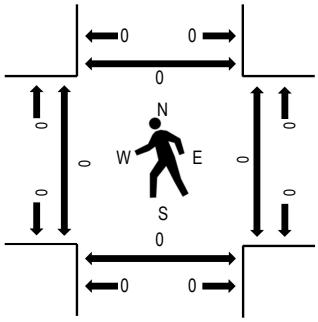
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

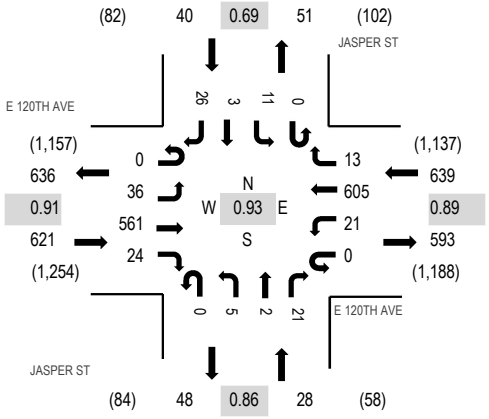
Traffic Counts - Motorized Vehicles

Interval Start Time	E 120TH AVE Eastbound				E 120TH AVE Westbound				JASPER ST Northbound				JASPER ST 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	2	103	1	0	0	94	0	0	5	0	5	0	4	0	6	220	954	0	0	0	0
7:15 AM	0	3	143	1	0	2	91	0	0	5	0	2	0	4	1	10	262	972	0	0	0	0
7:30 AM	0	0	106	0	0	0	87	0	0	2	0	5	1	6	0	4	211	933	0	0	0	0
7:45 AM	0	0	124	0	0	4	107	2	0	5	0	7	0	5	1	6	261	990	0	0	0	0
8:00 AM	0	0	124	1	0	0	101	0	0	0	0	4	0	4	0	4	238	936	0	0	0	0
8:15 AM	0	4	115	3	0	5	82	0	1	3	0	1	0	2	0	7	223		0	0	0	0
8:30 AM	0	1	129	2	0	2	114	1	0	3	1	7	0	7	0	1	268		0	0	0	0
8:45 AM	0	3	115	3	0	0	66	0	0	5	0	2	0	5	0	8	207		0	0	0	0
Count Total	0	13	959	11	0	13	742	3	1	28	1	33	1	37	2	46	1,890		0	0	0	0
Peak Hour	0	5	492	6	0	11	404	3	1	11	1	19	0	18	1	18	990		0	0	0	0

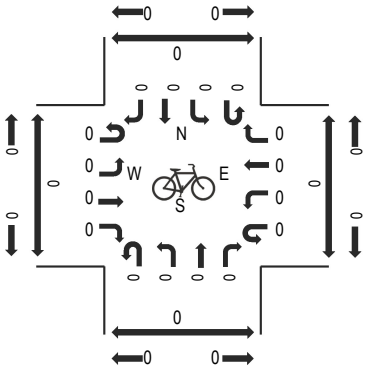
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 2 JASPER ST & E 120TH AVE PM
Date: Tuesday, June 3, 2025
Peak Hour: 04:15 PM - 05:15 PM
Peak 15-Minutes: 04:15 PM - 04:30 PM

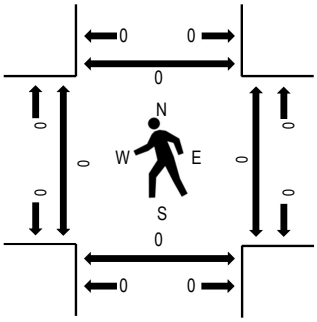
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	E 120TH AVE Eastbound				E 120TH AVE Westbound				JASPER ST Northbound				JASPER ST 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	1	9	153	3	0	2	131	3	0	2	0	1	0	2	0	7	314	1,306	0	0	0	0
4:15 PM	0	6	148	6	0	4	172	3	0	2	1	4	0	2	1	7	356	1,328	0	0	0	0
4:30 PM	0	10	145	7	0	7	130	5	0	1	1	6	0	3	0	8	323	1,315	0	0	0	0
4:45 PM	0	11	131	6	0	5	147	3	0	0	0	2	0	3	2	3	313	1,268	0	0	0	0
5:00 PM	0	9	137	5	0	5	156	2	0	2	0	9	0	3	0	8	336	1,225	0	0	0	0
5:15 PM	1	10	155	9	0	4	137	2	0	3	2	3	0	7	0	10	343		0	0	0	0
5:30 PM	0	7	136	6	0	3	105	1	0	3	1	6	0	3	0	5	276		0	0	0	0
5:45 PM	0	15	122	6	0	3	107	0	0	5	1	3	0	4	0	4	270		0	0	0	0
Count Total	2	77	1,127	48	0	33	1,085	19	0	18	6	34	0	27	3	52	2,531		0	0	0	0
Peak Hour	0	36	561	24	0	21	605	13	0	5	2	21	0	11	3	26	1,328		0	0	0	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
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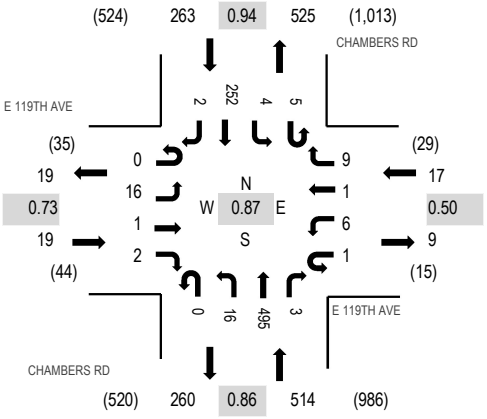
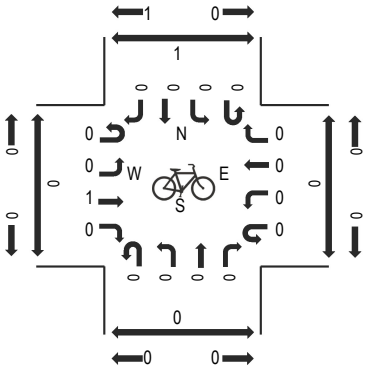
Location: 3 CHAMBERS RD & E 119TH AVE AM
Date: Tuesday, June 3, 2025
Peak Hour: 08:00 AM - 09:00 AM
Peak 15-Minutes: 08:45 AM - 09:00 AM

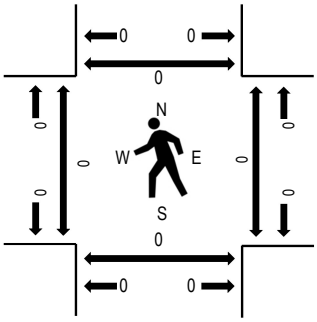
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

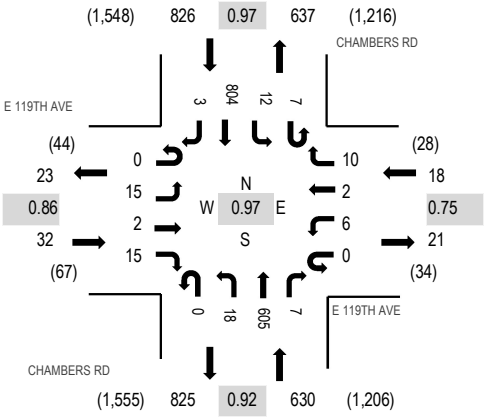
Traffic Counts - Motorized Vehicles

Interval Start Time	E 119TH AVE Eastbound				E 119TH AVE Westbound				CHAMBERS RD Northbound				CHAMBERS 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	3	0	0	0	0	0	1	0	4	100	0	1	1	54	0	164	770	0	0	0	0
7:15 AM	0	4	0	1	0	1	0	1	0	5	142	0	1	0	58	0	213	778	0	2	0	0
7:30 AM	0	5	0	2	0	2	1	6	0	3	111	0	2	3	67	0	202	768	0	0	0	0
7:45 AM	0	8	0	2	0	0	0	0	0	3	102	2	1	0	73	0	191	771	0	0	0	0
8:00 AM	0	2	0	1	0	2	1	2	0	5	95	0	1	1	61	1	172	813	0	0	0	0
8:15 AM	0	8	0	1	0	1	0	3	0	4	117	1	1	1	66	0	203		0	0	0	0
8:30 AM	0	3	0	0	1	1	0	1	0	2	139	1	0	0	56	1	205		0	0	0	0
8:45 AM	0	3	1	0	0	2	0	3	0	5	144	1	3	2	69	0	233		0	0	0	0
Count Total	0	36	1	7	1	9	2	17	0	31	950	5	10	8	504	2	1,583		0	2	0	0
Peak Hour	0	16	1	2	1	6	1	9	0	16	495	3	5	4	252	2	813		0	0	0	0

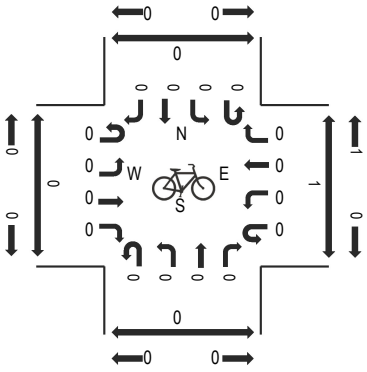
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 3 CHAMBERS RD & E 119TH AVE PM
Date: Tuesday, June 3, 2025
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:30 PM - 05:45 PM

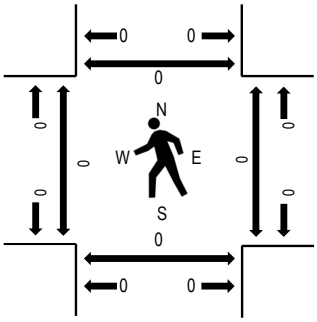
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

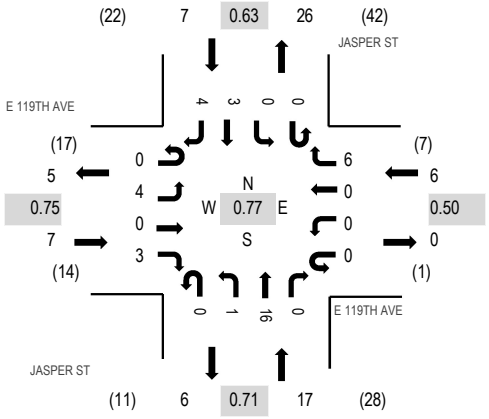
Traffic Counts - Motorized Vehicles

Interval Start Time	E 119TH AVE Eastbound				E 119TH AVE Westbound				CHAMBERS RD Northbound				CHAMBERS 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	7	0	2	0	3	0	0	0	4	131	2	1	2	170	0	322	1,391	0	0	0	0
4:15 PM	0	5	0	5	1	0	0	1	0	5	119	0	3	4	194	0	337	1,449	0	0	0	0
4:30 PM	0	3	1	7	0	2	0	1	0	8	159	1	1	0	175	0	358	1,475	0	0	0	0
4:45 PM	0	3	1	4	0	0	1	2	0	8	148	2	1	5	199	0	374	1,506	0	0	0	0
5:00 PM	0	5	0	2	0	3	0	2	0	3	148	4	4	4	205	0	380	1,458	0	0	0	0
5:15 PM	0	4	0	5	0	2	1	1	0	4	142	0	1	2	199	2	363		0	0	0	0
5:30 PM	0	3	1	4	0	1	0	5	0	3	167	1	1	1	201	1	389		0	0	0	0
5:45 PM	0	4	1	0	0	1	0	1	0	4	142	1	1	0	171	0	326		0	0	0	0
Count Total	0	34	4	29	1	12	2	13	0	39	1,156	11	13	18	1,514	3	2,849		0	0	0	0
Peak Hour	0	15	2	15	0	6	2	10	0	18	605	7	7	12	804	3	1,506		0	0	0	0

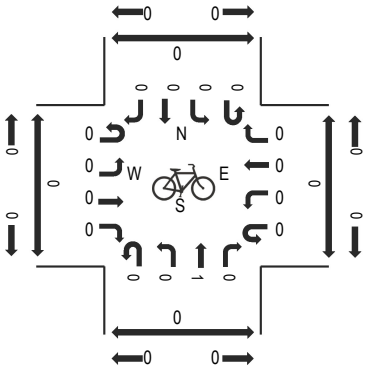
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 4 JASPER ST & E 119TH AVE AM
Date: Tuesday, June 3, 2025
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:15 AM - 07:30 AM

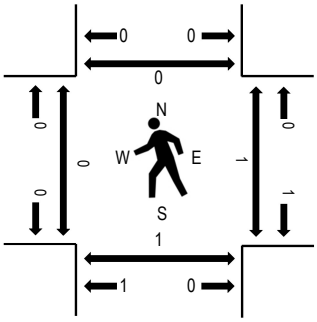
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	E 119TH AVE Eastbound				E 119TH AVE Westbound				JASPER ST Northbound				JASPER ST 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	0	0	3	0	1	5	0	0	0	0	0	9	37	0	1	0	0
7:15 AM	0	1	0	1	0	0	0	1	0	0	5	0	0	0	2	2	12	33	0	0	0	0
7:30 AM	0	1	0	2	0	0	0	2	0	0	1	0	0	0	0	0	6	31	0	0	1	0
7:45 AM	0	2	0	0	0	0	0	0	0	0	5	0	0	0	1	2	10	35	0	0	0	0
8:00 AM	0	2	0	0	0	0	0	0	0	0	1	0	0	0	1	1	5	34	0	0	0	0
8:15 AM	0	2	0	0	0	0	0	0	0	0	2	0	0	1	1	4	10		0	0	0	0
8:30 AM	0	2	0	0	0	0	1	0	0	0	4	0	0	0	1	2	10		0	0	0	0
8:45 AM	0	0	0	1	0	0	0	0	0	1	3	0	0	0	1	3	9		0	0	0	0
Count Total	0	10	0	4	0	0	1	6	0	2	26	0	0	1	7	14	71		0	1	1	0
Peak Hour	0	4	0	3	0	0	0	6	0	1	16	0	0	0	3	4	37		0	1	1	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
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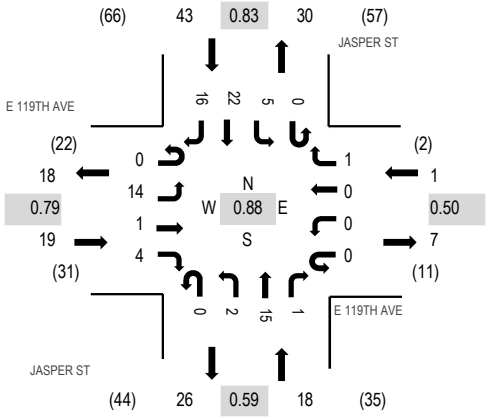
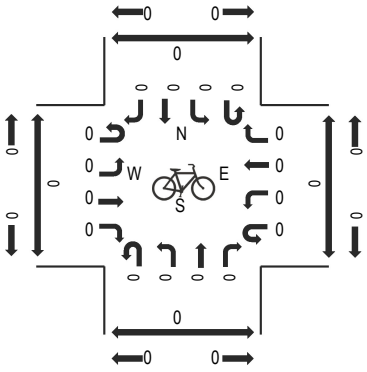
Location: 4 JASPER ST & E 119TH AVE PM
Date: Tuesday, June 3, 2025
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 04:30 PM - 04:45 PM

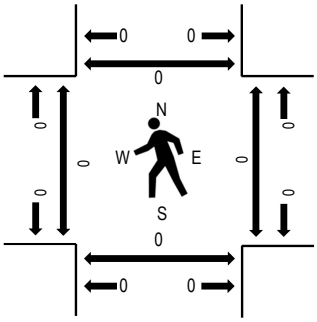
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	E 119TH AVE Eastbound				E 119TH AVE Westbound				JASPER ST Northbound				JASPER ST 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	3	1	0	0	1	0	0	0	0	5	0	0	0	5	0	15	67	0	0	0	0
4:15 PM	0	3	0	0	0	0	0	0	0	0	4	0	0	1	1	2	11	73	0	0	0	0
4:30 PM	0	4	0	2	0	0	0	1	0	1	2	1	0	2	7	3	23	81	0	0	0	0
4:45 PM	0	1	0	1	0	0	0	0	0	1	2	0	0	0	6	7	18	72	0	0	0	0
5:00 PM	0	3	1	1	0	0	0	0	0	0	8	0	0	1	5	2	21	67	0	0	0	0
5:15 PM	0	6	0	0	0	0	0	0	0	0	3	0	0	2	4	4	19		0	0	0	0
5:30 PM	0	2	0	1	0	0	0	0	0	0	4	0	0	2	3	2	14		0	0	0	0
5:45 PM	0	2	0	0	0	0	0	0	0	0	4	0	0	0	7	0	13		0	0	0	0
Count Total	0	24	2	5	0	1	0	1	0	2	32	1	0	8	38	20	134		0	0	0	0
Peak Hour	0	14	1	4	0	0	0	1	0	2	15	1	0	5	22	16	81		0	0	0	0

All Traffic Data Services

5 - CHAMBERS RD SOUTH OF E 119TH AVE

Time	NB	SB	Total
6/3/2025	7	11	18
6/3/2025 12:15:00 AM	7	21	28
6/3/2025 12:30:00 AM	10	11	21
6/3/2025 12:45:00 AM	5	14	19
6/3/2025 1:00:00 AM	4	10	14
6/3/2025 1:15:00 AM	5	5	10
6/3/2025 1:30:00 AM	4	5	9
6/3/2025 1:45:00 AM	3	3	6
6/3/2025 2:00:00 AM	3	5	8
6/3/2025 2:15:00 AM	4	4	8
6/3/2025 2:30:00 AM	9	9	18
6/3/2025 2:45:00 AM	1	1	2
6/3/2025 3:00:00 AM	2	2	4
6/3/2025 3:15:00 AM	6	2	8
6/3/2025 3:30:00 AM	7	4	11
6/3/2025 3:45:00 AM	14	5	19
6/3/2025 4:00:00 AM	12	8	20
6/3/2025 4:15:00 AM	19	8	27
6/3/2025 4:30:00 AM	33	5	38
6/3/2025 4:45:00 AM	26	15	41
6/3/2025 5:00:00 AM	42	13	55
6/3/2025 5:15:00 AM	70	24	94
6/3/2025 5:30:00 AM	81	32	113
6/3/2025 5:45:00 AM	81	39	120
6/3/2025 6:00:00 AM	85	24	109
6/3/2025 6:15:00 AM	106	42	148
6/3/2025 6:30:00 AM	111	53	164
6/3/2025 6:45:00 AM	117	55	172
6/3/2025 7:00:00 AM	104	54	158
6/3/2025 7:15:00 AM	147	60	207
6/3/2025 7:30:00 AM	114	71	185
6/3/2025 7:45:00 AM	107	75	182
6/3/2025 8:00:00 AM	100	64	164
6/3/2025 8:15:00 AM	122	68	190
6/3/2025 8:30:00 AM	142	57	199
6/3/2025 8:45:00 AM	150	71	221
6/3/2025 9:00:00 AM	122	80	202
6/3/2025 9:15:00 AM	112	81	193
6/3/2025 9:30:00 AM	108	73	181
6/3/2025 9:45:00 AM	118	75	193
6/3/2025 10:00:00 AM	111	81	192
6/3/2025 10:15:00 AM	128	100	228
6/3/2025 10:30:00 AM	137	86	223
6/3/2025 10:45:00 AM	100	76	176
6/3/2025 11:00:00 AM	94	92	186
6/3/2025 11:15:00 AM	121	105	226
6/3/2025 11:30:00 AM	113	129	242
6/3/2025 11:45:00 AM	109	140	249
Total	3,233	2,068	5,301
Percentage	61.0%	39.0%	
Peak Hour	8:15 AM	11:00 AM	11:00 AM
Volume	536	466	903
PHF	0.893	0.832	0.907

All Traffic Data Services

5 - CHAMBERS RD SOUTH OF E 119TH AVE

Time	NB	SB	Total
6/3/2025 12:00:00 PM	106	102	208
6/3/2025 12:15:00 PM	114	128	242
6/3/2025 12:30:00 PM	140	122	262
6/3/2025 12:45:00 PM	120	121	241
6/3/2025 1:00:00 PM	103	113	216
6/3/2025 1:15:00 PM	113	127	240
6/3/2025 1:30:00 PM	126	113	239
6/3/2025 1:45:00 PM	128	122	250
6/3/2025 2:00:00 PM	114	135	249
6/3/2025 2:15:00 PM	105	154	259
6/3/2025 2:30:00 PM	99	144	243
6/3/2025 2:45:00 PM	116	140	256
6/3/2025 3:00:00 PM	112	122	234
6/3/2025 3:15:00 PM	120	148	268
6/3/2025 3:30:00 PM	147	137	284
6/3/2025 3:45:00 PM	117	181	298
6/3/2025 4:00:00 PM	137	175	312
6/3/2025 4:15:00 PM	124	199	323
6/3/2025 4:30:00 PM	168	184	352
6/3/2025 4:45:00 PM	158	203	361
6/3/2025 5:00:00 PM	155	210	365
6/3/2025 5:15:00 PM	146	206	352
6/3/2025 5:30:00 PM	171	206	377
6/3/2025 5:45:00 PM	147	172	319
6/3/2025 6:00:00 PM	124	169	293
6/3/2025 6:15:00 PM	125	164	289
6/3/2025 6:30:00 PM	127	188	315
6/3/2025 6:45:00 PM	114	178	292
6/3/2025 7:00:00 PM	91	157	248
6/3/2025 7:15:00 PM	77	123	200
6/3/2025 7:30:00 PM	95	107	202
6/3/2025 7:45:00 PM	67	98	165
6/3/2025 8:00:00 PM	47	111	158
6/3/2025 8:15:00 PM	63	101	164
6/3/2025 8:30:00 PM	62	106	168
6/3/2025 8:45:00 PM	46	88	134
6/3/2025 9:00:00 PM	44	82	126
6/3/2025 9:15:00 PM	49	92	141
6/3/2025 9:30:00 PM	41	68	109
6/3/2025 9:45:00 PM	39	68	107
6/3/2025 10:00:00 PM	24	62	86
6/3/2025 10:15:00 PM	35	46	81
6/3/2025 10:30:00 PM	29	40	69
6/3/2025 10:45:00 PM	12	29	41
6/3/2025 11:00:00 PM	17	35	52
6/3/2025 11:15:00 PM	19	28	47
6/3/2025 11:30:00 PM	13	17	30
6/3/2025 11:45:00 PM	9	23	32
Total	4,455	5,844	10,299
Percentage	43.3%	56.7%	
Peak Hour	4:45 PM	4:45 PM	4:45 PM
Volume	630	825	1,455
PHF	0.921	0.982	0.965
Grand Total	7,688	7,912	15,600
Percentage	49.3%	50.7%	

APPENDIX B

Level of Service Definitions

The following information is referenced from the Highway Capacity Manual: A Guide for Multimodal Mobility Analysis, 7th Edition, Transportation Research Board, 2022: Chapter 19 – Signalized Intersections.

Motorized Vehicle 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 10 s/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.

Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio[a]	
	$v/c \leq 1.0$	$v/c > 1.0$
≤ 10	A	F
> 10 – 20	B	F
> 20 – 35	C	F
> 35 – 55	D	F
> 55 – 80	E	F
> 80	F	F

Note: [a] For approach-based and intersectionwide assessments, LOS is defined solely by control delay.

The following information is referenced from the Highway Capacity Manual: A Guide for Multimodal Mobility Analysis, 7th Edition, Transportation Research Board, 2022: Chapter 20 – Two-Way Stop-Controlled Intersections, Chapter 21 – All-Way Stop-Controlled Intersections, and Chapter 22 - Roundabouts.

Motorized Vehicle Level of Service (LOS) for Unsignalized & Roundabout Intersections

LOS is a quantitative stratification of performance measure(s) representing quality of service. Quality of service describes how well a transportation facility or service operates from a traveler's perspective. LOS is measured on an A – F scale, with LOS A representing the best operating conditions from a traveler's perspective.

Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio[a]	
	$v/c \leq 1.0$	$v/c > 1.0$
0 – 10	A	F
> 10 – 15	B	F
> 15 – 25	C	F
> 25 – 35	D	F
> 35 – 50	E	F
> 50	F	F

Note: The LOS criteria apply to each lane on a given approach and to each approach on the minor street. LOS is not calculated for major-street approaches or for the intersection as a whole.

[a] For approaches and intersectionwide assessment, LOS is defined solely by control delay.

APPENDIX C

Capacity Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	390	163	81	356	5	370	28	82	17	18	64
Future Volume (vph)	49	390	163	81	356	5	370	28	82	17	18	64
Satd. Flow (prot)	1770	3383	0	1770	1859	0	1770	1863	1583	0	1685	0
Flt Permitted	0.401			0.324			0.687				0.960	
Satd. Flow (perm)	747	3383	0	604	1859	0	1280	1863	1583	0	1631	0
Satd. Flow (RTOR)		102			1				145		70	
Lane Group Flow (vph)	53	601	0	88	392	0	402	30	89	0	108	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		
Detector Phase	5	2		1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	11.0		10.0	11.0		11.0	11.0	11.0	11.0	11.0	
Total Split (s)	10.0	21.0		10.0	21.0		29.0	29.0	29.0	29.0	29.0	
Total Split (%)	16.7%	35.0%		16.7%	35.0%		48.3%	48.3%	48.3%	48.3%	48.3%	
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	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	6.0		5.0	6.0		6.0	6.0	6.0		6.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	23.5	18.3		24.6	20.6		21.4	21.4	21.4		21.4	
Actuated g/C Ratio	0.39	0.31		0.41	0.34		0.36	0.36	0.36		0.36	
v/c Ratio	0.14	0.54		0.25	0.61		0.88	0.05	0.14		0.17	
Control Delay (s/veh)	11.1	17.9		12.2	25.8		41.3	12.0	1.4		6.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay (s/veh)	11.1	17.9		12.2	25.8		41.3	12.0	1.4		6.5	
LOS	B	B		B	C		D	B	A		A	
Approach Delay (s/veh)		17.3			23.3			32.8			6.5	
Approach LOS		B			C			C			A	
Queue Length 50th (ft)	11	83		18	134		126	7	0		8	
Queue Length 95th (ft)	28	132		41	#273		#269	20	10		35	
Internal Link Dist (ft)		349			857			538			280	
Turn Bay Length (ft)	95			410			190		235			
Base Capacity (vph)	382	1104		352	639		490	714	696		668	
Starvation Cap Reductn	0	0		0	0		0	0	0		0	
Spillback Cap Reductn	0	0		0	0		0	0	0		0	
Storage Cap Reductn	0	0		0	0		0	0	0		0	
Reduced v/c Ratio	0.14	0.54		0.25	0.61		0.82	0.04	0.13		0.16	

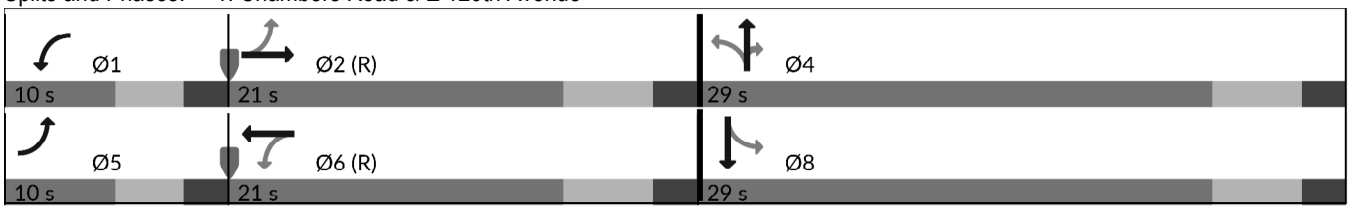
Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay (s/veh): 22.9	Intersection LOS: C
Intersection Capacity Utilization 64.5%	ICU Level of Service C
Analysis Period (min) 15	

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

Splits and Phases: 1: Chambers Road & E 120th Avenue



Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	492	6	11	404	3	12	1	19	18	1	18
Future Vol, veh/h	5	492	6	11	404	3	12	1	19	18	1	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	Free
Storage Length	150	-	-	220	-	120	55	-	165	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	535	7	12	439	3	13	1	21	20	1	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	439	0	0	541	0	0	1012	1012	271	742	1015	-
Stage 1	-	-	-	-	-	-	549	549	-	463	463	-
Stage 2	-	-	-	-	-	-	464	463	-	279	552	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	1119	-	-	1025	-	0	205	238	728	318	237	0
Stage 1	-	-	-	-	-	0	488	516	-	578	563	0
Stage 2	-	-	-	-	-	0	578	563	-	705	514	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	1119	-	-	1025	-	-	201	235	728	302	234	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	201	235	-	302	234	-
Stage 1	-	-	-	-	-	-	486	513	-	571	557	-
Stage 2	-	-	-	-	-	-	570	557	-	680	511	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.08	0.23	15.69	17.88
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	201	235	728	1119	-	-	1025	-	302	234	-
HCM Lane V/C Ratio	0.065	0.005	0.028	0.005	-	-	0.012	-	0.065	0.005	-
HCM Ctrl Dly (s/v)	24.2	20.4	10.1	8.2	-	-	8.6	-	17.7	20.5	0
HCM Lane LOS	C	C	B	A	-	-	A	-	C	C	A
HCM 95th %tile Q(veh)	0.2	0	0.1	0	-	-	0	-	0.2	0	-

Intersection	
Intersection Delay, s/veh	2.7
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	7	7	18	7
Demand Flow Rate, veh/h	7	7	18	7
Vehicles Circulating, veh/h	3	22	4	1
Vehicles Exiting, veh/h	5	0	6	28
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.7	2.7	2.8	2.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
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
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	7	7	18	7
Cap Entry Lane, veh/h	1376	1349	1374	1378
Entry HV Adj Factor	1.000	1.000	0.981	0.992
Flow Entry, veh/h	7	7	18	7
Cap Entry, veh/h	1376	1349	1349	1367
V/C Ratio	0.005	0.005	0.013	0.005
Control Delay, s/veh	2.7	2.7	2.8	2.7
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	16	1	2	7	1	9	16	495	3	5	4	252	2
Future Vol, veh/h	16	1	2	7	1	9	16	495	3	5	4	252	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	1	2	8	1	10	17	538	3	5	4	274	2

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	599	871	138	732	870	271	276	0	0	541	541	0	0
Stage 1	295	295	-	574	574	-	-	-	-	-	-	-	-
Stage 2	304	576	-	157	296	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	435	311	1010	347	311	727	1356	-	-	652	1023	-	-
Stage 1	768	717	-	471	501	-	-	-	-	-	-	-	-
Stage 2	680	500	-	930	716	-	-	-	-	-	-	-	-
Platoon blocked, %	0	0	0	0	0		0	-	-			-	-
Mov Cap-1 Maneuver	417	303	1010	336	303	727	1356	-	-	770	770	-	-
Mov Cap-2 Maneuver	417	303	-	336	303	-	-	-	-	-	-	-	-
Stage 1	759	708	-	465	495	-	-	-	-	-	-	-	-
Stage 2	661	494	-	915	707	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	13.68	13.05	0.24	0.33
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1356	-	-	435	466	770	-	-
HCM Lane V/C Ratio	0.013	-	-	0.047	0.04	0.013	-	-
HCM Ctrl Dly (s/v)	7.7	-	-	13.7	13.1	9.7	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	440	577	181	410	5	393	39	187	11	34	51
Future Volume (vph)	97	440	577	181	410	5	393	39	187	11	34	51
Satd. Flow (prot)	1770	3238	0	1770	1859	0	1770	1863	1583	0	1720	0
Flt Permitted	0.292			0.227			0.690				0.974	
Satd. Flow (perm)	544	3238	0	423	1859	0	1285	1863	1583	0	1685	0
Satd. Flow (RTOR)		540			1				203		55	
Lane Group Flow (vph)	105	1105	0	197	451	0	427	42	203	0	104	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4		4	8		
Detector Phase	5	2		1	6		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	11.0		10.0	11.0		11.0	11.0	11.0	11.0	11.0	
Total Split (s)	10.0	22.0		10.0	22.0		28.0	28.0	28.0	28.0	28.0	
Total Split (%)	16.7%	36.7%		16.7%	36.7%		46.7%	46.7%	46.7%	46.7%	46.7%	
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	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	6.0		5.0	6.0		6.0	6.0	6.0		6.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	22.3	16.2		23.6	18.6		21.4	21.4	21.4		21.4	
Actuated g/C Ratio	0.37	0.27		0.39	0.31		0.36	0.36	0.36		0.36	
v/c Ratio	0.34	0.87		0.69	0.78		0.93	0.06	0.29		0.16	
Control Delay (s/veh)	13.2	20.3		27.3	33.8		49.9	12.7	3.6		7.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	
Total Delay (s/veh)	13.2	20.3		27.3	33.8		49.9	12.7	3.6		7.9	
LOS	B	C		C	C		D	B	A		A	
Approach Delay (s/veh)		19.7			31.9			33.6			7.9	
Approach LOS		B			C			C			A	
Queue Length 50th (ft)	21	101		42	157		142	10	0		11	
Queue Length 95th (ft)	45	#220		#108	#317		#300	27	35		38	
Internal Link Dist (ft)		349			857			538			280	
Turn Bay Length (ft)	95			410			190		235			
Base Capacity (vph)	306	1267		287	576		471	683	709		652	
Starvation Cap Reductn	0	0		0	0		0	0	0		0	
Spillback Cap Reductn	0	0		0	0		0	0	0		0	
Storage Cap Reductn	0	0		0	0		0	0	0		0	
Reduced v/c Ratio	0.34	0.87		0.69	0.78		0.91	0.06	0.29		0.16	

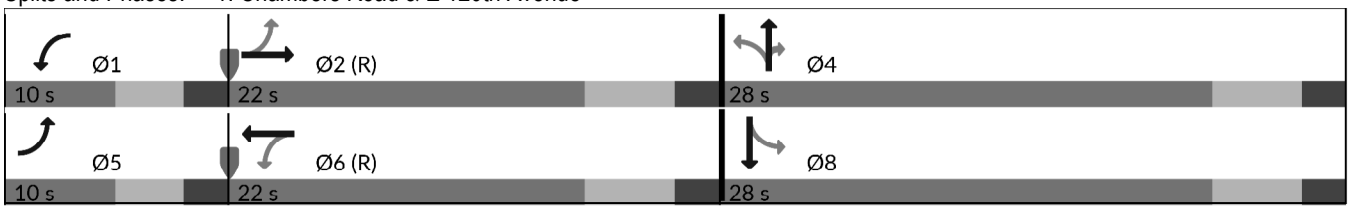
Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay (s/veh): 25.8	Intersection LOS: C
Intersection Capacity Utilization 83.4%	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: Chambers Road & E 120th Avenue



Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	561	24	21	605	13	5	2	21	11	3	26
Future Vol, veh/h	36	561	24	21	605	13	5	2	21	11	3	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	Free
Storage Length	150	-	-	220	-	120	55	-	165	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	610	26	23	658	14	5	2	23	12	3	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	658	0	0	636	0	0	1406	1404	318	1088	1417	-
Stage 1	-	-	-	-	-	-	701	701	-	703	703	-
Stage 2	-	-	-	-	-	-	705	703	-	384	714	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	928	-	-	946	-	0	107	139	679	181	136	0
Stage 1	-	-	-	-	-	0	396	440	-	427	439	0
Stage 2	-	-	-	-	-	0	426	439	-	611	434	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	928	-	-	946	-	-	98	130	679	161	127	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	98	130	-	161	127	-
Stage 1	-	-	-	-	-	-	380	421	-	417	428	-
Stage 2	-	-	-	-	-	-	413	428	-	563	416	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.52	0.3	18.07	30.14
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	98	130	679	928	-	-	946	-	161	127	-
HCM Lane V/C Ratio	0.055	0.017	0.034	0.042	-	-	0.024	-	0.074	0.026	-
HCM Ctrl Dly (s/v)	43.9	33.2	10.5	9	-	-	8.9	-	29.1	34	0
HCM Lane LOS	E	D	B	A	-	-	A	-	D	D	A
HCM 95th %tile Q(veh)	0.2	0.1	0.1	0.1	-	-	0.1	-	0.2	0.1	-

Intersection	
Intersection Delay, s/veh	2.9
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	20	1	19	46
Demand Flow Rate, veh/h	20	1	19	46
Vehicles Circulating, veh/h	29	33	21	2
Vehicles Exiting, veh/h	19	7	28	32
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.8	2.7	2.8	2.9
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
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
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	20	1	19	46
Cap Entry Lane, veh/h	1340	1334	1351	1377
Entry HV Adj Factor	0.999	1.000	0.983	0.990
Flow Entry, veh/h	20	1	19	46
Cap Entry, veh/h	1338	1334	1328	1363
V/C Ratio	0.015	0.001	0.014	0.033
Control Delay, s/veh	2.8	2.7	2.8	2.9
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	15	2	15	6	2	10	18	605	7	7	12	804	3
Future Vol, veh/h	15	2	15	6	2	10	18	605	7	7	12	804	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	2	16	7	2	11	20	658	8	8	13	874	3

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1286	1621	439	1180	1619	333	877	0	0	665	665	0	0
Stage 1	917	917	-	701	701	-	-	-	-	-	-	-	-
Stage 2	369	704	-	479	918	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	200	132	*868	*250	133	663	967	-	-	544	920	-	-
Stage 1	480	482	-	*396	439	-	-	-	-	-	-	-	-
Stage 2	623	438	-	*818	481	-	-	-	-	-	-	-	-
Platoon blocked, %	0	0	0	0	0		0	-	-			-	-
Mov Cap-1 Maneuver	185	126	*868	*230	126	663	967	-	-	727	727	-	-
Mov Cap-2 Maneuver	185	126	-	*230	126	-	-	-	-	-	-	-	-
Stage 1	466	468	-	*388	430	-	-	-	-	-	-	-	-
Stage 2	598	429	-	*777	467	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	19.69	17.16	0.25	0.23
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	967	-	-	280	316	727	-	-
HCM Lane V/C Ratio	0.02	-	-	0.124	0.062	0.028	-	-
HCM Ctrl Dly (s/v)	8.8	-	-	19.7	17.2	10.1	-	-
HCM Lane LOS	A	-	-	C	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.2	0.1	-	-

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)	67	457	173	118	394	5	370	28	82	18	27	76
Future Volume (vph)	67	457	173	118	394	5	370	28	82	18	27	76
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	3433	1654	0	1770	1656	0
Flt Permitted	0.500			0.387			0.411			0.681		
Satd. Flow (perm)	931	3539	1583	721	3532	0	1485	1654	0	1269	1656	0
Satd. Flow (RTOR)			188		2			89			83	
Lane Group Flow (vph)	73	497	188	128	433	0	402	119	0	20	112	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	7	1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	11.0	10.0	10.0	11.0		10.0	11.0		10.0	11.0	
Total Split (s)	10.0	23.0	14.0	11.0	24.0		14.0	16.0		10.0	12.0	
Total Split (%)	16.7%	38.3%	23.3%	18.3%	40.0%		23.3%	26.7%		16.7%	20.0%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	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	0.0	
Total Lost Time (s)	5.0	6.0	5.0	5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	
Act Effct Green (s)	26.7	21.6	37.6	29.1	24.5		18.3	15.5		10.5	5.8	
Actuated g/C Ratio	0.45	0.36	0.63	0.49	0.41		0.31	0.26		0.18	0.10	
v/c Ratio	0.15	0.39	0.18	0.28	0.30		0.54	0.24		0.08	0.48	
Control Delay (s/veh)	9.5	17.7	1.8	10.4	15.1		18.4	8.9		14.3	17.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	9.5	17.7	1.8	10.4	15.1		18.4	8.9		14.3	17.7	
LOS	A	B	A	B	B		B	A		B	B	
Approach Delay (s/veh)		12.9			14.0			16.3			17.2	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	13	78	0	24	64		53	7		5	10	
Queue Length 95th (ft)	31	118	23	49	100		84	48		16	51	
Internal Link Dist (ft)		349			857			538			280	
Turn Bay Length (ft)	95		185	410			190			90		
Base Capacity (vph)	487	1275	1039	456	1444		744	503		263	240	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.15	0.39	0.18	0.28	0.30		0.54	0.24		0.08	0.47	

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay (s/veh): 14.4	Intersection LOS: B
Intersection Capacity Utilization 50.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Chambers Road & E 120th Avenue



Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	565	6	12	477	3	13	1	20	19	1	19
Future Vol, veh/h	5	565	6	12	477	3	13	1	20	19	1	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	Free
Storage Length	150	-	-	220	-	120	55	-	165	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	614	7	13	518	3	14	1	22	21	1	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	518	0	0	621	0	0	914	1173	310	802	1176	-
Stage 1	-	-	-	-	-	-	628	628	-	545	545	-
Stage 2	-	-	-	-	-	-	286	545	-	257	632	-
Critical Hdwy	4.14	-	-	5.34	-	-	6.99	6.54	7.14	6.99	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.22	-	-	3.12	-	-	3.67	4.02	3.92	3.67	4.02	-
Pot Cap-1 Maneuver	1044	-	-	594	-	0	256	191	585	303	190	0
Stage 1	-	-	-	-	-	0	369	474	-	475	517	0
Stage 2	-	-	-	-	-	0	673	517	-	689	472	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	1044	-	-	594	-	-	247	186	585	282	185	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	247	186	-	282	185	-
Stage 1	-	-	-	-	-	-	367	471	-	465	506	-
Stage 2	-	-	-	-	-	-	657	506	-	659	470	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.07	0.27	15.24	19.06
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	247	186	585	1044	-	-	594	-	282	185	-
HCM Lane V/C Ratio	0.057	0.006	0.037	0.005	-	-	0.022	-	0.073	0.006	-
HCM Ctrl Dly (s/v)	20.4	24.5	11.4	8.5	-	-	11.2	-	18.8	24.6	0
HCM Lane LOS	C	C	B	A	-	-	B	-	C	C	A
HCM 95th %tile Q(veh)	0.2	0	0.1	0	-	-	0.1	-	0.2	0	-

Intersection	
Intersection Delay, s/veh	2.8
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	15	7	28	7
Demand Flow Rate, veh/h	15	7	28	7
Vehicles Circulating, veh/h	3	32	4	10
Vehicles Exiting, veh/h	14	0	14	29
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.7	2.7	2.8	2.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
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
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	15	7	28	7
Cap Entry Lane, veh/h	1376	1336	1374	1366
Entry HV Adj Factor	1.000	1.000	0.987	0.992
Flow Entry, veh/h	15	7	28	7
Cap Entry, veh/h	1376	1336	1357	1354
V/C Ratio	0.011	0.005	0.020	0.005
Control Delay, s/veh	2.7	2.7	2.8	2.7
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	17	1	26	7	9	10	64	525	3	5	11	288	18
Future Vol, veh/h	17	1	26	7	9	10	64	525	3	5	11	288	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	1	28	8	10	11	70	571	3	5	12	313	20

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	787	1071	166	903	1079	287	333	0	0	574	574	0	0
Stage 1	358	358	-	711	711	-	-	-	-	-	-	-	-
Stage 2	429	713	-	192	367	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	315	235	967	257	232	710	1290	-	-	621	995	-	-
Stage 1	704	671	-	390	434	-	-	-	-	-	-	-	-
Stage 2	574	434	-	887	664	-	-	-	-	-	-	-	-
Platoon blocked, %	0	0	0	0	0		0	-	-			-	-
Mov Cap-1 Maneuver	275	217	967	230	215	710	1290	-	-	832	832	-	-
Mov Cap-2 Maneuver	275	217	-	230	215	-	-	-	-	-	-	-	-
Stage 1	689	657	-	369	411	-	-	-	-	-	-	-	-
Stage 2	522	410	-	841	651	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	13.49	18.19	0.86	0.47
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1290	-	-	472	301	832	-	-
HCM Lane V/C Ratio	0.054	-	-	0.101	0.094	0.021	-	-
HCM Ctrl Dly (s/v)	8	-	-	13.5	18.2	9.4	-	-
HCM Lane LOS	A	-	-	B	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.3	0.3	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	124	530	612	234	457	5	393	39	187	12	47	64
Future Volume (vph)	124	530	612	234	457	5	393	39	187	12	47	64
Satd. Flow (prot)	1770	3539	1583	1770	3536	0	3433	1632	0	1770	1701	0
Flt Permitted	0.468			0.293			0.391			0.607		
Satd. Flow (perm)	872	3539	1583	546	3536	0	1413	1632	0	1131	1701	0
Satd. Flow (RTOR)			344		2			203			70	
Lane Group Flow (vph)	135	576	665	254	502	0	427	245	0	13	121	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	7	1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	11.0	10.0	10.0	11.0		10.0	11.0		10.0	11.0	
Total Split (s)	10.0	22.0	16.0	11.0	23.0		16.0	17.0		10.0	11.0	
Total Split (%)	16.7%	36.7%	26.7%	18.3%	38.3%		26.7%	28.3%		16.7%	18.3%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	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	0.0	
Total Lost Time (s)	5.0	6.0	5.0	5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	
Act Effct Green (s)	24.5	18.4	35.0	27.4	21.6		19.4	16.4		9.8	5.1	
Actuated g/C Ratio	0.41	0.31	0.58	0.46	0.36		0.32	0.27		0.16	0.09	
v/c Ratio	0.31	0.53	0.62	0.68	0.39		0.52	0.41		0.05	0.58	
Control Delay (s/veh)	11.7	20.5	7.2	22.9	17.6		17.4	7.5		13.8	26.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	11.7	20.5	7.2	22.9	17.6		17.4	7.5		13.8	26.5	
LOS	B	C	A	C	B		B	A		B	C	
Approach Delay (s/veh)		13.2			19.4			13.8			25.3	
Approach LOS		B			B			B			C	
Queue Length 50th (ft)	26	95	59	54	78		55	10		3	18	
Queue Length 95th (ft)	54	142	153	#119	119		86	67		12	#77	
Internal Link Dist (ft)		349			857			538			280	
Turn Bay Length (ft)	95		185	410			190			90		
Base Capacity (vph)	433	1083	1074	375	1273		836	607		237	209	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.31	0.53	0.62	0.68	0.39		0.51	0.40		0.05	0.58	

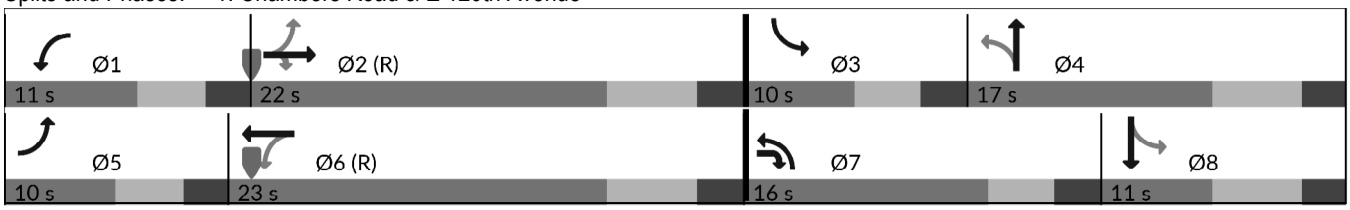
Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay (s/veh): 15.5	Intersection LOS: B
Intersection Capacity Utilization 70.6%	ICU Level of Service C
Analysis Period (min) 15	

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

Splits and Phases: 1: Chambers Road & E 120th Avenue



Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	658	25	22	706	14	5	2	22	12	3	28
Future Vol, veh/h	38	658	25	22	706	14	5	2	22	12	3	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	Free
Storage Length	150	-	-	220	-	120	55	-	165	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	715	27	24	767	15	5	2	24	13	3	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	767	0	0	742	0	0	1245	1627	371	1185	1640	-
Stage 1	-	-	-	-	-	-	811	811	-	815	815	-
Stage 2	-	-	-	-	-	-	433	815	-	370	825	-
Critical Hdwy	4.14	-	-	5.34	-	-	6.99	6.54	7.14	6.99	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.22	-	-	3.12	-	-	3.67	4.02	3.92	3.67	4.02	-
Pot Cap-1 Maneuver	842	-	-	520	-	0	154	101	535	169	99	0
Stage 1	-	-	-	-	-	0	276	391	-	328	389	0
Stage 2	-	-	-	-	-	0	552	389	-	589	385	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	842	-	-	520	-	-	136	92	535	144	90	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	136	92	-	144	90	-
Stage 1	-	-	-	-	-	-	262	371	-	313	371	-
Stage 2	-	-	-	-	-	-	522	371	-	532	366	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.5	0.37	17.89	35.35
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	136	92	535	842	-	-	520	-	144	90	-
HCM Lane V/C Ratio	0.04	0.024	0.045	0.049	-	-	0.046	-	0.091	0.036	-
HCM Ctrl Dly (s/v)	32.7	45.2	12	9.5	-	-	12.3	-	32.6	46.5	0
HCM Lane LOS	D	E	B	A	-	-	B	-	D	E	A
HCM 95th %tile Q(veh)	0.1	0.1	0.1	0.2	-	-	0.1	-	0.3	0.1	-

Intersection	
Intersection Delay, s/veh	2.9
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	32	1	31	48
Demand Flow Rate, veh/h	32	1	31	49
Vehicles Circulating, veh/h	31	46	22	13
Vehicles Exiting, veh/h	31	7	41	34
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.9	2.7	2.9	3.0
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
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
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	32	1	31	49
Cap Entry Lane, veh/h	1337	1317	1349	1362
Entry HV Adj Factor	0.999	1.000	0.989	0.990
Flow Entry, veh/h	32	1	31	48
Cap Entry, veh/h	1336	1317	1335	1347
V/C Ratio	0.024	0.001	0.023	0.036
Control Delay, s/veh	2.9	2.7	2.9	3.0
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	16	2	48	6	12	11	83	942	7	7	23	884	25
Future Vol, veh/h	16	2	48	6	12	11	83	942	7	7	23	884	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	2	52	7	13	12	90	1024	8	8	25	961	27

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1739	2252	494	1755	2261	516	988	0	0	1032	1032	0	0
Stage 1	1040	1040	-	1208	1208	-	-	-	-	-	-	-	-
Stage 2	699	1212	-	547	1053	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	77	43	*868	*74	42	504	859	-	-	317	669	-	-
Stage 1	389	411	-	*194	254	-	-	-	-	-	-	-	-
Stage 2	397	253	-	*818	404	-	-	-	-	-	-	-	-
Platoon blocked, %	0	0	0	0	0		0	-	-			-	-
Mov Cap-1 Maneuver	42	36	*868	*56	36	504	859	-	-	526	526	-	-
Mov Cap-2 Maneuver	42	36	-	*56	36	-	-	-	-	-	-	-	-
Stage 1	365	386	-	*174	227	-	-	-	-	-	-	-	-
Stage 2	327	227	-	*718	379	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	58.33	112.02	0.78	0.39
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	859	-	-	135	62	526	-	-
HCM Lane V/C Ratio	0.105	-	-	0.531	0.508	0.062	-	-
HCM Ctrl Dly (s/v)	9.7	-	-	58.3	112	12.3	-	-
HCM Lane LOS	A	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-	2.6	2	0.2	-	-

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)	103	779	295	178	680	10	673	51	148	33	41	124
Future Volume (vph)	103	779	295	178	680	10	673	51	148	33	41	124
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	3433	1654	0	1770	1652	0
Flt Permitted	0.286			0.267			0.412			0.623		
Satd. Flow (perm)	533	3539	1583	497	3532	0	1489	1654	0	1160	1652	0
Satd. Flow (RTOR)			321		2			161			135	
Lane Group Flow (vph)	112	847	321	193	750	0	732	216	0	36	180	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	7	1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	11.0	10.0	10.0	11.0		10.0	11.0		10.0	11.0	
Total Split (s)	10.0	23.0	15.0	10.0	23.0		15.0	17.0		10.0	12.0	
Total Split (%)	16.7%	38.3%	25.0%	16.7%	38.3%		25.0%	28.3%		16.7%	20.0%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	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	0.0	
Total Lost Time (s)	5.0	6.0	5.0	5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	
Act Effct Green (s)	23.1	17.0	33.0	24.1	19.1		21.9	16.9		11.9	5.9	
Actuated g/C Ratio	0.39	0.28	0.55	0.40	0.32		0.37	0.28		0.20	0.10	
v/c Ratio	0.36	0.85	0.32	0.63	0.67		0.85	0.37		0.13	0.64	
Control Delay (s/veh)	12.9	30.3	1.9	21.9	22.2		27.2	9.1		14.4	20.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	12.9	30.3	1.9	21.9	22.2		27.2	9.1		14.4	20.9	
LOS	B	C	A	C	C		C	A		B	C	
Approach Delay (s/veh)		21.7			22.2			23.1			19.8	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	22	150	0	39	128		106	13		8	15	
Queue Length 95th (ft)	46	#243	28	#89	185		#179	69		24	#85	
Internal Link Dist (ft)		349			857			538			280	
Turn Bay Length (ft)	95		185	410			190			90		
Base Capacity (vph)	311	1002	1015	308	1123		866	581		280	286	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.36	0.85	0.32	0.63	0.67		0.85	0.37		0.13	0.63	

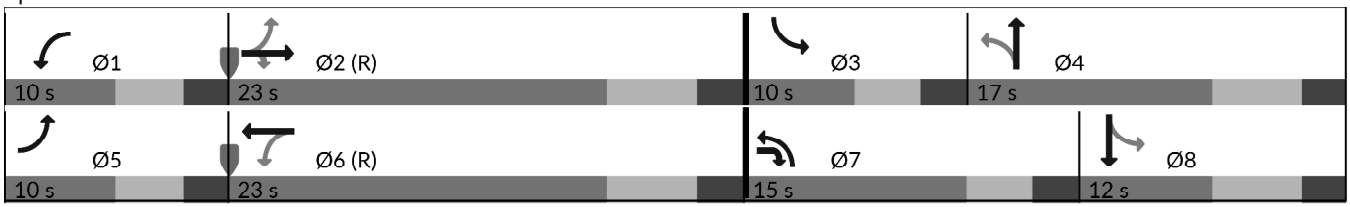
Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay (s/veh): 22.1	Intersection LOS: C
Intersection Capacity Utilization 78.7%	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: Chambers Road & E 120th Avenue



Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	943	11	29	791	5	44	2	40	33	3	34
Future Vol, veh/h	10	943	11	29	791	5	44	2	40	33	3	34
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	Free
Storage Length	150	-	-	220	-	120	55	-	165	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	1025	12	32	860	5	48	2	43	36	3	37

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	860	0	0	1037	0	0	1547	1976	518	1356	1982	-
Stage 1	-	-	-	-	-	-	1053	1053	-	923	923	-
Stage 2	-	-	-	-	-	-	495	923	-	433	1059	-
Critical Hdwy	4.14	-	-	5.34	-	-	6.99	6.54	7.14	6.99	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.22	-	-	3.12	-	-	3.67	4.02	3.92	3.67	4.02	-
Pot Cap-1 Maneuver	777	-	-	376	-	0	97	61	430	130	61	0
Stage 1	-	-	-	-	-	0	187	301	-	283	347	0
Stage 2	-	-	-	-	-	0	509	347	-	540	299	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	777	-	-	376	-	-	83	55	430	102	55	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	83	55	-	102	55	-
Stage 1	-	-	-	-	-	-	184	297	-	259	318	-
Stage 2	-	-	-	-	-	-	461	318	-	475	295	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.1	0.55	57.68	59.73
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	83	55	430	777	-	-	376	-	102	55	-
HCM Lane V/C Ratio	0.579	0.039	0.101	0.014	-	-	0.084	-	0.352	0.059	-
HCM Ctrl Dly (s/v)	96.4	72.6	14.3	9.7	-	-	15.5	-	58.4	74.6	0
HCM Lane LOS	F	F	B	A	-	-	C	-	F	F	A
HCM 95th %tile Q(veh)	2.6	0.1	0.3	0	-	-	0.3	-	1.4	0.2	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	943	11	29	791	5	44	2	40	33	3	34
Future Volume (vph)	10	943	11	29	791	5	44	2	40	33	3	34
Satd. Flow (prot)	1770	5075	0	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.324			0.254			0.851			0.851		
Satd. Flow (perm)	604	5075	0	473	3539	1583	1585	1863	1583	1585	1863	1583
Satd. Flow (RTOR)		4				145			145			145
Lane Group Flow (vph)	11	1037	0	32	860	5	48	2	43	36	3	37
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	4	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	11.0		10.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Total Split (s)	10.0	36.0		10.0	36.0	36.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (%)	16.7%	60.0%		16.7%	60.0%	60.0%	23.3%	23.3%	23.3%	23.3%	23.3%	23.3%
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	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	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0		5.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	44.7	44.1		45.7	46.1	46.1	7.0	7.0	7.0	7.0	7.0	7.0
Actuated g/C Ratio	0.75	0.74		0.76	0.77	0.77	0.12	0.12	0.12	0.12	0.12	0.12
v/c Ratio	0.02	0.28		0.07	0.32	0.00	0.26	0.01	0.14	0.20	0.01	0.12
Control Delay (s/veh)	5.2	7.0		3.3	5.2	0.0	27.4	23.0	0.9	26.2	23.0	0.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.2	7.0		3.3	5.2	0.0	27.4	23.0	0.9	26.2	23.0	0.8
LOS	A	A		A	A	A	C	C	A	C	C	A
Approach Delay (s/veh)		7.0			5.1			15.0			13.7	
Approach LOS		A			A			B			B	
Queue Length 50th (ft)	1	53		3	55	0	16	1	0	12	1	0
Queue Length 95th (ft)	m2	m93		9	142	0	42	6	0	34	7	0
Internal Link Dist (ft)		313			358			568			326	
Turn Bay Length (ft)	150			220		120	55		165	75		75
Base Capacity (vph)	553	3733		475	2720	1250	211	248	336	211	248	336
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.28		0.07	0.32	0.00	0.23	0.01	0.13	0.17	0.01	0.11

Intersection Summary

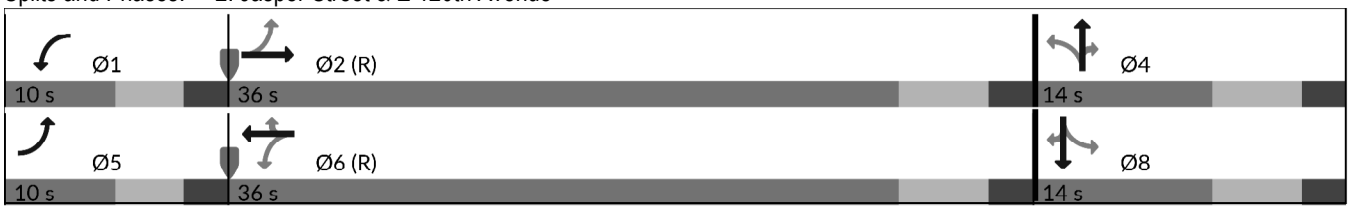
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.32

Intersection Signal Delay (s/veh): 6.8	Intersection LOS: A
Intersection Capacity Utilization 45.2%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 2: Jasper Street & E 120th Avenue



Intersection	
Intersection Delay, s/veh	2.8
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	21	12	45	15
Demand Flow Rate, veh/h	21	12	46	15
Vehicles Circulating, veh/h	7	54	8	11
Vehicles Exiting, veh/h	19	0	20	55
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.7	2.8	2.9	2.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
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
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	21	12	46	15
Cap Entry Lane, veh/h	1370	1306	1369	1364
Entry HV Adj Factor	1.000	1.000	0.985	0.991
Flow Entry, veh/h	21	12	45	15
Cap Entry, veh/h	1370	1306	1348	1352
V/C Ratio	0.015	0.009	0.034	0.011
Control Delay, s/veh	2.7	2.8	2.9	2.7
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	29	2	28	13	15	16	79	898	8	9	15	477	20
Future Vol, veh/h	29	2	28	13	15	16	79	898	8	9	15	477	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	90	75	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	32	2	30	14	16	17	86	976	9	10	16	518	22

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1249	1738	270	1465	1745	492	540	0	0	985	985	0	0
Stage 1	582	582	-	1152	1152	-	-	-	-	-	-	-	-
Stage 2	668	1157	-	313	592	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	163	95	*972	109	94	522	1170	-	-	340	697	-	-
Stage 1	611	594	-	210	270	-	-	-	-	-	-	-	-
Stage 2	414	269	-	914	587	-	-	-	-	-	-	-	-
Platoon blocked, %	0	0	0	0	0		0	-	-			-	-
Mov Cap-1 Maneuver	114	84	*972	90	83	522	1170	-	-	490	490	-	-
Mov Cap-2 Maneuver	114	84	-	90	83	-	-	-	-	-	-	-	-
Stage 1	579	562	-	195	250	-	-	-	-	-	-	-	-
Stage 2	347	249	-	835	556	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	32.87	47.81	0.67	0.59
HCM LOS	D	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1170	-	-	192	86	522	490	-	-
HCM Lane V/C Ratio	0.073	-	-	0.334	0.354	0.033	0.053	-	-
HCM Ctrl Dly (s/v)	8.3	-	-	32.9	68.2	12.1	12.8	-	-
HCM Lane LOS	A	-	-	D	F	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	1.4	1.4	0.1	0.2	-	-

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)	196	923	1043	369	813	11	731	71	338	23	71	102
Future Volume (vph)	196	923	1043	369	813	11	731	71	338	23	71	102
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	3433	1632	0	1770	1697	0
Flt Permitted	0.286			0.267			0.390			0.500		
Satd. Flow (perm)	533	3539	1583	497	3532	0	1409	1632	0	931	1697	0
Satd. Flow (RTOR)			196		2			343			94	
Lane Group Flow (vph)	213	1003	1134	401	896	0	795	444	0	25	188	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	7	1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	11.0	10.0	10.0	11.0		10.0	11.0		10.0	11.0	
Total Split (s)	10.0	23.0	15.0	11.0	24.0		15.0	16.0		10.0	11.0	
Total Split (%)	16.7%	38.3%	25.0%	18.3%	40.0%		25.0%	26.7%		16.7%	18.3%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	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	0.0	
Total Lost Time (s)	5.0	6.0	5.0	5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	
Act Effct Green (s)	23.0	17.0	33.0	25.0	18.0		21.0	16.0		11.0	5.0	
Actuated g/C Ratio	0.38	0.28	0.55	0.42	0.30		0.35	0.27		0.18	0.08	
v/c Ratio	0.69	1.00	1.18	1.20	0.84		0.96	0.65		0.10	0.83	
Control Delay (s/veh)	25.3	53.0	109.8	134.6	29.2		42.6	12.5		14.8	46.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	25.3	53.0	109.8	134.6	29.2		42.6	12.5		14.8	46.8	
LOS	C	D	F	F	C		D	B		B	D	
Approach Delay (s/veh)		77.9			61.8			31.8			43.1	
Approach LOS		E			E			C			D	
Queue Length 50th (ft)	42	~190	~478	~116	157		122	25		6	34	
Queue Length 95th (ft)	#100	#313	#698	#271	#254		#195	#165		19	#133	
Internal Link Dist (ft)		349			857			538			280	
Turn Bay Length (ft)	95		185	410			190			90		
Base Capacity (vph)	307	1002	958	334	1061		830	686		240	227	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.69	1.00	1.18	1.20	0.84		0.96	0.65		0.10	0.83	

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.20

Intersection Signal Delay (s/veh): 61.1	Intersection LOS: E
Intersection Capacity Utilization 108.3%	ICU Level of Service G
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: Chambers Road & E 120th Avenue



Intersection	
Int Delay, s/veh	71.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	67	1098	43	61	1177	23	61	6	62	20	7	48
Future Vol, veh/h	67	1098	43	61	1177	23	61	6	62	20	7	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	Free
Storage Length	150	-	-	220	-	120	55	-	165	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	73	1193	47	66	1279	25	66	7	67	22	8	52

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1279	0	0	1240	0	0	2139	2774	620	2038	2798	-
Stage 1	-	-	-	-	-	-	1363	1363	-	1412	1412	-
Stage 2	-	-	-	-	-	-	776	1412	-	626	1386	-
Critical Hdwy	4.14	-	-	5.34	-	-	6.99	6.54	7.14	6.99	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.22	-	-	3.12	-	-	3.67	4.02	3.92	3.67	4.02	-
Pot Cap-1 Maneuver	538	-	-	299	-	0	~ 38	19	369	45	18	0
Stage 1	-	-	-	-	-	0	113	214	-	142	203	0
Stage 2	-	-	-	-	-	0	347	203	-	411	209	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	538	-	-	299	-	-	~ 12	13	369	~ 14	12	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 12	13	-	~ 14	12	-
Stage 1	-	-	-	-	-	-	98	185	-	111	158	-
Stage 2	-	-	-	-	-	-	257	158	-	280	180	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.71	1.01	$ 1275.83	$ 730.75
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	12	13	369	538	-	-	299	-	14	12	-
HCM Lane V/C Ratio	5.484	0.515	0.183	0.135	-	-	0.222	-	1.522	0.623	-
HCM Ctrl Dly (s/v)	$ 2635.7	$ 459.4	16.9	12.7	-	-	20.4	-	$ 806.5	$ 514.4	0
HCM Lane LOS	F	F	C	B	-	-	C	-	F	F	A
HCM 95th %tile Q(veh)	9.4	1.2	0.7	0.5	-	-	0.8	-	3.4	1.4	-

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)	67	1098	43	61	1177	23	61	6	62	20	7	48
Future Volume (vph)	67	1098	43	61	1177	23	61	6	62	20	7	48
Satd. Flow (prot)	1770	5055	0	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.158			0.197			0.752			0.753		
Satd. Flow (perm)	294	5055	0	367	3539	1583	1401	1863	1583	1403	1863	1583
Satd. Flow (RTOR)		14				145			145			145
Lane Group Flow (vph)	73	1240	0	66	1279	25	66	7	67	22	8	52
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	4	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	11.0		10.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Total Split (s)	10.0	37.0		10.0	37.0	37.0	13.0	13.0	13.0	13.0	13.0	13.0
Total Split (%)	16.7%	61.7%		16.7%	61.7%	61.7%	21.7%	21.7%	21.7%	21.7%	21.7%	21.7%
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	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	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0		5.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	41.6	38.8		41.6	38.8	38.8	6.7	6.7	6.7	6.7	6.7	6.7
Actuated g/C Ratio	0.69	0.65		0.69	0.65	0.65	0.11	0.11	0.11	0.11	0.11	0.11
v/c Ratio	0.22	0.38		0.18	0.56	0.02	0.43	0.03	0.22	0.14	0.04	0.17
Control Delay (s/veh)	6.8	8.0		4.2	9.9	0.0	33.7	24.0	1.9	26.2	24.1	1.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	6.8	8.0		4.2	9.9	0.0	33.7	24.0	1.9	26.2	24.1	1.2
LOS	A	A		A	A	A	C	C	A	C	C	A
Approach Delay (s/veh)		7.9			9.4			18.0			10.2	
Approach LOS		A			A			B			B	
Queue Length 50th (ft)	9	81		6	168	0	23	2	0	7	3	0
Queue Length 95th (ft)	m9	m86		14	235	0	56	12	3	26	13	0
Internal Link Dist (ft)		313			358			568			326	
Turn Bay Length (ft)	150			220		120	55		165	75		75
Base Capacity (vph)	330	3277		375	2291	1075	163	217	312	163	217	312
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.38		0.18	0.56	0.02	0.40	0.03	0.21	0.13	0.04	0.17

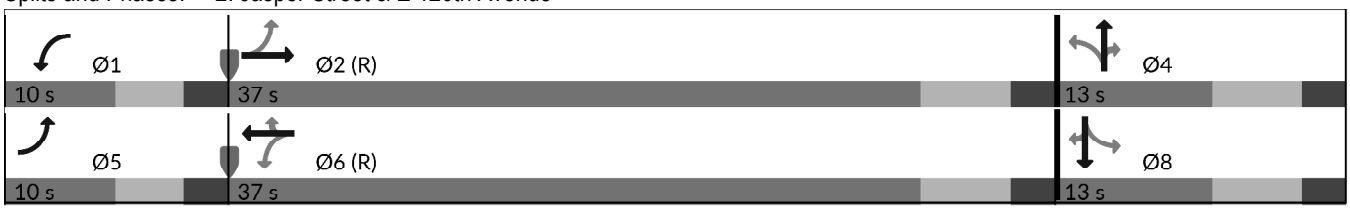
Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay (s/veh): 9.2	Intersection LOS: A
Intersection Capacity Utilization 60.9%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 2: Jasper Street & E 120th Avenue



Intersection	
Intersection Delay, s/veh	3.2
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	49	2	51	89
Demand Flow Rate, veh/h	50	2	52	91
Vehicles Circulating, veh/h	58	78	40	16
Vehicles Exiting, veh/h	49	14	68	64
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.1	2.8	3.1	3.2
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
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
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	50	2	52	91
Cap Entry Lane, veh/h	1301	1274	1325	1358
Entry HV Adj Factor	0.979	1.000	0.987	0.979
Flow Entry, veh/h	49	2	51	89
Cap Entry, veh/h	1274	1274	1308	1329
V/C Ratio	0.038	0.002	0.039	0.067
Control Delay, s/veh	3.1	2.8	3.1	3.2
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	27	4	59	11	28	20	97	1101	18	13	33	1483	27
Future Vol, veh/h	27	4	59	11	28	20	97	1101	18	13	33	1483	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	90	75	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	4	64	12	30	22	105	1197	20	14	36	1612	29

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	2551	3154	821	2326	3159	608	1641	0	0	1216	1216	0	0
Stage 1	1727	1727	-	1417	1417	-	-	-	-	-	-	-	-
Stage 2	824	1427	-	908	1741	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	~ 13	6	*694	*25	~ 6	439	490	-	-	241	569	-	-
Stage 1	164	202	-	*144	201	-	-	-	-	-	-	-	-
Stage 2	333	199	-	*654	197	-	-	-	-	-	-	-	-
Platoon blocked, %	0	0	0	0	0		0	-	-			-	-
Mov Cap-1 Maneuver	-	~ 4	*694	-	~ 4	439	490	-	-	401	401	-	-
Mov Cap-2 Maneuver	-	~ 4	-	-	~ 4	-	-	-	-	-	-	-	-
Stage 1	144	177	-	*113	158	-	-	-	-	-	-	-	-
Stage 2	201	156	-	*507	172	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v			1.14	0.45
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	490	-	-	-	-	439	401	-	-
HCM Lane V/C Ratio	0.215	-	-	-	-	0.05	0.125	-	-
HCM Ctrl Dly (s/v)	14.3	-	-	-	-	13.6	15.3	-	-
HCM Lane LOS	B	-	-	-	-	B	C	-	-
HCM 95th %tile Q(veh)	0.8	-	-	-	-	0.2	0.4	-	-

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

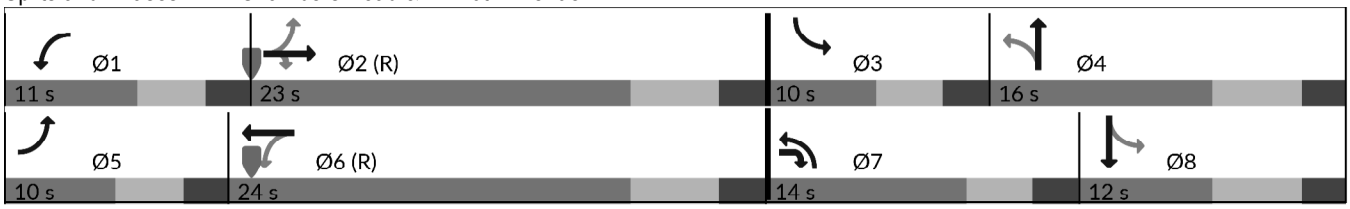
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	461	173	118	396	5	383	28	82	18	27	76
Future Volume (vph)	67	461	173	118	396	5	383	28	82	18	27	76
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	3433	1654	0	1770	1656	0
Flt Permitted	0.499			0.383			0.411			0.681		
Satd. Flow (perm)	930	3539	1583	713	3532	0	1485	1654	0	1269	1656	0
Satd. Flow (RTOR)			188		2			89			83	
Lane Group Flow (vph)	73	501	188	128	435	0	416	119	0	20	112	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	7	1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	11.0	10.0	10.0	11.0		10.0	11.0		10.0	11.0	
Total Split (s)	10.0	23.0	14.0	11.0	24.0		14.0	16.0		10.0	12.0	
Total Split (%)	16.7%	38.3%	23.3%	18.3%	40.0%		23.3%	26.7%		16.7%	20.0%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	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	0.0	
Total Lost Time (s)	5.0	6.0	5.0	5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	
Act Effct Green (s)	26.7	21.6	37.6	29.1	24.5		18.3	15.5		10.5	5.8	
Actuated g/C Ratio	0.45	0.36	0.63	0.49	0.41		0.31	0.26		0.18	0.10	
v/c Ratio	0.15	0.39	0.18	0.28	0.30		0.56	0.24		0.08	0.48	
Control Delay (s/veh)	9.5	17.7	1.8	10.4	15.1		18.7	8.9		14.3	17.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	9.5	17.7	1.8	10.4	15.1		18.7	8.9		14.3	17.7	
LOS	A	B	A	B	B		B	A		B	B	
Approach Delay (s/veh)		13.0			14.0			16.5			17.2	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	13	78	0	24	64		56	7		5	10	
Queue Length 95th (ft)	31	119	23	49	101		87	48		16	51	
Internal Link Dist (ft)		349			857			538			280	
Turn Bay Length (ft)	95		185	410			190			90		
Base Capacity (vph)	486	1273	1062	453	1443		744	503		263	240	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.15	0.39	0.18	0.28	0.30		0.56	0.24		0.08	0.47	

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay (s/veh): 14.5	Intersection LOS: B
Intersection Capacity Utilization 51.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Chambers Road & E 120th Avenue



Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	572	6	15	477	3	15	1	23	19	1	19
Future Vol, veh/h	5	572	6	15	477	3	15	1	23	19	1	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	Free
Storage Length	150	-	-	220	-	120	55	-	165	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	622	7	16	518	3	16	1	25	21	1	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	518	0	0	628	0	0	928	1187	314	811	1190	-
Stage 1	-	-	-	-	-	-	636	636	-	551	551	-
Stage 2	-	-	-	-	-	-	292	551	-	260	639	-
Critical Hdwy	4.14	-	-	5.34	-	-	6.99	6.54	7.14	6.99	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.22	-	-	3.12	-	-	3.67	4.02	3.92	3.67	4.02	-
Pot Cap-1 Maneuver	1044	-	-	589	-	0	250	187	582	298	186	0
Stage 1	-	-	-	-	-	0	365	470	-	471	514	0
Stage 2	-	-	-	-	-	0	667	514	-	686	469	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	1044	-	-	589	-	-	241	181	582	275	180	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	241	181	-	275	180	-
Stage 1	-	-	-	-	-	-	363	468	-	458	499	-
Stage 2	-	-	-	-	-	-	647	499	-	652	466	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.07	0.34	15.5	19.47
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	241	181	582	1044	-	-	589	-	275	180	-
HCM Lane V/C Ratio	0.068	0.006	0.043	0.005	-	-	0.028	-	0.075	0.006	-
HCM Ctrl Dly (s/v)	21	25	11.5	8.5	-	-	11.3	-	19.2	25.1	0
HCM Lane LOS	C	D	B	A	-	-	B	-	C	D	A
HCM 95th %tile Q(veh)	0.2	0	0.1	0	-	-	0.1	-	0.2	0	-

Intersection	
Intersection Delay, s/veh	2.8
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	15	7	30	11
Demand Flow Rate, veh/h	15	7	30	11
Vehicles Circulating, veh/h	4	34	4	10
Vehicles Exiting, veh/h	17	0	15	31
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.7	2.7	2.8	2.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
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
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	15	7	30	11
Cap Entry Lane, veh/h	1374	1333	1374	1366
Entry HV Adj Factor	1.000	1.000	0.987	0.993
Flow Entry, veh/h	15	7	30	11
Cap Entry, veh/h	1374	1333	1356	1356
V/C Ratio	0.011	0.005	0.022	0.008
Control Delay, s/veh	2.7	2.7	2.8	2.7
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	17	1	26	13	9	10	64	526	4	5	11	288	18
Future Vol, veh/h	17	1	26	13	9	10	64	526	4	5	11	288	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	18	1	28	14	10	11	70	572	4	5	12	313	20

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	788	1073	166	905	1080	288	333	0	0	576	576	0	0
Stage 1	358	358	-	713	713	-	-	-	-	-	-	-	-
Stage 2	430	715	-	192	367	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	315	234	967	257	232	709	1290	-	-	619	993	-	-
Stage 1	704	671	-	389	434	-	-	-	-	-	-	-	-
Stage 2	574	433	-	887	664	-	-	-	-	-	-	-	-
Platoon blocked, %	0	0	0	0	0		0	-	-			-	-
Mov Cap-1 Maneuver	275	217	967	230	214	709	1290	-	-	830	830	-	-
Mov Cap-2 Maneuver	275	217	-	230	214	-	-	-	-	-	-	-	-
Stage 1	689	657	-	368	410	-	-	-	-	-	-	-	-
Stage 2	522	409	-	841	651	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	13.5	19.43	0.86	0.47
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1290	-	-	471	284	830	-	-
HCM Lane V/C Ratio	0.054	-	-	0.101	0.122	0.021	-	-
HCM Ctrl Dly (s/v)	8	-	-	13.5	19.4	9.4	-	-
HCM Lane LOS	A	-	-	B	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.3	0.4	0.1	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	124	543	613	234	458	5	401	39	187	12	47	64
Future Volume (vph)	124	543	613	234	458	5	401	39	187	12	47	64
Satd. Flow (prot)	1770	3539	1583	1770	3536	0	3433	1632	0	1770	1701	0
Flt Permitted	0.467			0.280			0.391			0.607		
Satd. Flow (perm)	870	3539	1583	522	3536	0	1413	1632	0	1131	1701	0
Satd. Flow (RTOR)			340		2			203			70	
Lane Group Flow (vph)	135	590	666	254	503	0	436	245	0	13	121	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	7	1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	11.0	10.0	10.0	11.0		10.0	11.0		10.0	11.0	
Total Split (s)	10.0	22.0	16.0	11.0	23.0		16.0	17.0		10.0	11.0	
Total Split (%)	16.7%	36.7%	26.7%	18.3%	38.3%		26.7%	28.3%		16.7%	18.3%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	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	0.0	
Total Lost Time (s)	5.0	6.0	5.0	5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	
Act Effct Green (s)	24.5	18.3	35.0	27.3	21.5		19.5	16.5		9.8	5.1	
Actuated g/C Ratio	0.41	0.31	0.58	0.46	0.36		0.33	0.28		0.16	0.09	
v/c Ratio	0.31	0.55	0.63	0.69	0.40		0.53	0.41		0.05	0.58	
Control Delay (s/veh)	11.7	20.7	7.3	24.1	17.7		17.6	7.5		13.8	26.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	11.7	20.7	7.3	24.1	17.7		17.6	7.5		13.8	26.5	
LOS	B	C	A	C	B		B	A		B	C	
Approach Delay (s/veh)		13.4			19.8			13.9			25.3	
Approach LOS		B			B			B			C	
Queue Length 50th (ft)	26	98	60	54	78		57	10		3	18	
Queue Length 95th (ft)	54	146	155	#124	120		88	67		12	#77	
Internal Link Dist (ft)		349			857			538			280	
Turn Bay Length (ft)	95		185	410			190			90		
Base Capacity (vph)	432	1081	1072	366	1270		836	607		237	209	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.31	0.55	0.62	0.69	0.40		0.52	0.40		0.05	0.58	

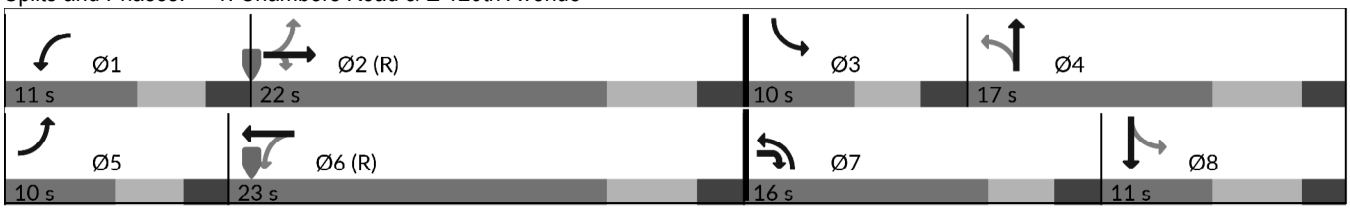
Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay (s/veh): 15.7	Intersection LOS: B
Intersection Capacity Utilization 70.6%	ICU Level of Service C
Analysis Period (min) 15	

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

Splits and Phases: 1: Chambers Road & E 120th Avenue



Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	38	662	25	32	706	14	6	2	24	12	3	28
Future Vol, veh/h	38	662	25	32	706	14	6	2	24	12	3	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	Free
Storage Length	150	-	-	220	-	120	55	-	165	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	720	27	35	767	15	7	2	26	13	3	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	767	0	0	747	0	0	1271	1653	373	1208	1666	-
Stage 1	-	-	-	-	-	-	816	816	-	837	837	-
Stage 2	-	-	-	-	-	-	455	837	-	372	829	-
Critical Hdwy	4.14	-	-	5.34	-	-	6.99	6.54	7.14	6.99	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.22	-	-	3.12	-	-	3.67	4.02	3.92	3.67	4.02	-
Pot Cap-1 Maneuver	842	-	-	518	-	0	148	97	533	163	96	0
Stage 1	-	-	-	-	-	0	274	389	-	319	380	0
Stage 2	-	-	-	-	-	0	536	380	-	588	383	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	842	-	-	518	-	-	127	86	533	135	85	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	127	86	-	135	85	-
Stage 1	-	-	-	-	-	-	260	370	-	297	355	-
Stage 2	-	-	-	-	-	-	496	355	-	528	364	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.5	0.54	18.59	37.49
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	127	86	533	842	-	-	518	-	135	85	-
HCM Lane V/C Ratio	0.051	0.025	0.049	0.049	-	-	0.067	-	0.097	0.038	-
HCM Ctrl Dly (s/v)	34.8	47.7	12.1	9.5	-	-	12.5	-	34.6	49.1	0
HCM Lane LOS	D	E	B	A	-	-	B	-	D	E	A
HCM 95th %tile Q(veh)	0.2	0.1	0.2	0.2	-	-	0.2	-	0.3	0.1	-

Intersection	
Intersection Delay, s/veh	2.9
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	32	1	34	51
Demand Flow Rate, veh/h	32	1	34	52
Vehicles Circulating, veh/h	32	49	22	13
Vehicles Exiting, veh/h	33	7	42	37
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.9	2.7	2.9	3.0
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
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
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	32	1	34	52
Cap Entry Lane, veh/h	1336	1313	1349	1362
Entry HV Adj Factor	0.999	1.000	0.988	0.990
Flow Entry, veh/h	32	1	34	51
Cap Entry, veh/h	1335	1313	1334	1348
V/C Ratio	0.024	0.001	0.025	0.038
Control Delay, s/veh	2.9	2.7	2.9	3.0
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	16	2	48	10	12	11	83	946	10	7	24	884	25
Future Vol, veh/h	16	2	48	10	12	11	83	946	10	7	24	884	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	2	52	11	13	12	90	1028	11	8	26	961	27

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1743	2261	494	1763	2270	520	988	0	0	1039	1039	0	0
Stage 1	1042	1042	-	1214	1214	-	-	-	-	-	-	-	-
Stage 2	701	1220	-	549	1055	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	76	42	*868	*73	42	501	859	-	-	313	665	-	-
Stage 1	388	410	-	*192	253	-	-	-	-	-	-	-	-
Stage 2	395	251	-	*818	403	-	-	-	-	-	-	-	-
Platoon blocked, %	0	0	0	0	0		0	-	-			-	-
Mov Cap-1 Maneuver	42	35	*868	*54	35	501	859	-	-	526	526	-	-
Mov Cap-2 Maneuver	42	35	-	*54	35	-	-	-	-	-	-	-	-
Stage 1	363	384	-	*172	226	-	-	-	-	-	-	-	-
Stage 2	325	225	-	*716	377	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	60.13	130.08	0.77	0.41
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	859	-	-	133	60	526	-	-
HCM Lane V/C Ratio	0.105	-	-	0.54	0.597	0.064	-	-
HCM Ctrl Dly (s/v)	9.7	-	-	60.1	130.1	12.3	-	-
HCM Lane LOS	A	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-	2.6	2.5	0.2	-	-

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)	103	783	295	178	682	10	686	51	148	33	41	124
Future Volume (vph)	103	783	295	178	682	10	686	51	148	33	41	124
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	3433	1654	0	1770	1652	0
Flt Permitted	0.286			0.267			0.412			0.623		
Satd. Flow (perm)	533	3539	1583	497	3532	0	1489	1654	0	1160	1652	0
Satd. Flow (RTOR)			321		2			161			135	
Lane Group Flow (vph)	112	851	321	193	752	0	746	216	0	36	180	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	7	1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	11.0	10.0	10.0	11.0		10.0	11.0		10.0	11.0	
Total Split (s)	10.0	23.0	15.0	10.0	23.0		15.0	17.0		10.0	12.0	
Total Split (%)	16.7%	38.3%	25.0%	16.7%	38.3%		25.0%	28.3%		16.7%	20.0%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	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	0.0	
Total Lost Time (s)	5.0	6.0	5.0	5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	
Act Effct Green (s)	23.1	17.0	33.0	24.1	19.1		21.9	16.9		11.9	5.9	
Actuated g/C Ratio	0.39	0.28	0.55	0.40	0.32		0.37	0.28		0.20	0.10	
v/c Ratio	0.36	0.85	0.32	0.63	0.67		0.86	0.37		0.13	0.64	
Control Delay (s/veh)	12.9	30.6	1.9	21.9	22.3		28.5	9.1		14.4	20.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	12.9	30.6	1.9	21.9	22.3		28.5	9.1		14.4	20.9	
LOS	B	C	A	C	C		C	A		B	C	
Approach Delay (s/veh)		21.9			22.2			24.1			19.8	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	22	151	0	39	128		109	13		8	15	
Queue Length 95th (ft)	46	#245	28	#89	186		#158	69		24	#85	
Internal Link Dist (ft)		349			857			538			280	
Turn Bay Length (ft)	95		185	410			190			90		
Base Capacity (vph)	311	1002	1015	308	1123		866	581		280	286	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.36	0.85	0.32	0.63	0.67		0.86	0.37		0.13	0.63	

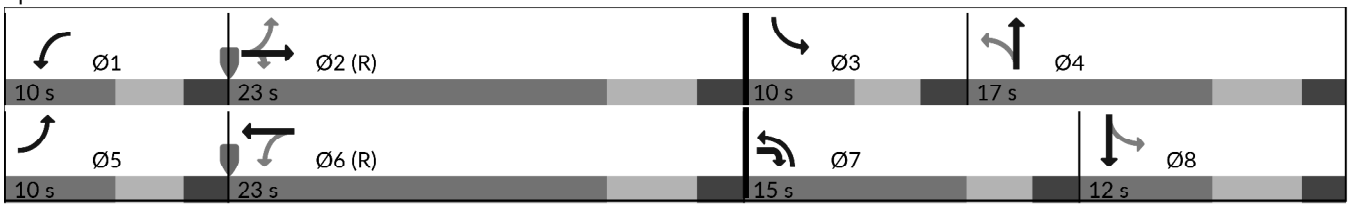
Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay (s/veh): 22.5	Intersection LOS: C
Intersection Capacity Utilization 79.2%	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: Chambers Road & E 120th Avenue



Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	950	11	32	791	5	46	2	43	33	3	34
Future Vol, veh/h	10	950	11	32	791	5	46	2	43	33	3	34
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	Free
Storage Length	150	-	-	220	-	120	55	-	165	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	1033	12	35	860	5	50	2	47	36	3	37

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	860	0	0	1045	0	0	1561	1990	522	1365	1996	-
Stage 1	-	-	-	-	-	-	1060	1060	-	929	929	-
Stage 2	-	-	-	-	-	-	501	929	-	436	1066	-
Critical Hdwy	4.14	-	-	5.34	-	-	6.99	6.54	7.14	6.99	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.22	-	-	3.12	-	-	3.67	4.02	3.92	3.67	4.02	-
Pot Cap-1 Maneuver	777	-	-	372	-	0	95	60	427	128	60	0
Stage 1	-	-	-	-	-	0	185	299	-	281	344	0
Stage 2	-	-	-	-	-	0	504	344	-	537	297	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	777	-	-	372	-	-	80	54	427	98	53	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	80	54	-	98	53	-
Stage 1	-	-	-	-	-	-	182	295	-	254	312	-
Stage 2	-	-	-	-	-	-	452	312	-	468	293	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.1	0.61	62.34	62.52
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	80	54	427	777	-	-	372	-	98	53	-
HCM Lane V/C Ratio	0.626	0.04	0.109	0.014	-	-	0.093	-	0.364	0.061	-
HCM Ctrl Dly (s/v)	106.6	74.8	14.5	9.7	-	-	15.7	-	61.2	77	0
HCM Lane LOS	F	F	B	A	-	-	C	-	F	F	A
HCM 95th %tile Q(veh)	2.8	0.1	0.4	0	-	-	0.3	-	1.5	0.2	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	950	11	32	791	5	46	2	43	33	3	34
Future Volume (vph)	10	950	11	32	791	5	46	2	43	33	3	34
Satd. Flow (prot)	1770	5075	0	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.324			0.252			0.851			0.851		
Satd. Flow (perm)	604	5075	0	469	3539	1583	1585	1863	1583	1585	1863	1583
Satd. Flow (RTOR)		4				145			145			145
Lane Group Flow (vph)	11	1045	0	35	860	5	50	2	47	36	3	37
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	4	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	11.0		10.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Total Split (s)	10.0	36.0		10.0	36.0	36.0	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (%)	16.7%	60.0%		16.7%	60.0%	60.0%	23.3%	23.3%	23.3%	23.3%	23.3%	23.3%
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	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	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0		5.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	44.7	44.1		45.7	46.1	46.1	7.1	7.1	7.1	7.0	7.0	7.0
Actuated g/C Ratio	0.75	0.74		0.76	0.77	0.77	0.12	0.12	0.12	0.12	0.12	0.12
v/c Ratio	0.02	0.28		0.07	0.32	0.00	0.27	0.01	0.15	0.20	0.01	0.12
Control Delay (s/veh)	5.3	7.1		3.4	5.2	0.0	27.6	23.0	1.0	26.1	23.0	0.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.3	7.1		3.4	5.2	0.0	27.6	23.0	1.0	26.1	23.0	0.8
LOS	A	A		A	A	A	C	C	A	C	C	A
Approach Delay (s/veh)		7.1			5.1			14.9			13.7	
Approach LOS		A			A			B			B	
Queue Length 50th (ft)	1	54		3	56	0	17	1	0	12	1	0
Queue Length 95th (ft)	m2	m93		10	142	0	44	6	0	34	7	0
Internal Link Dist (ft)		313			358			568			326	
Turn Bay Length (ft)	150			220		120	55		165	75		75
Base Capacity (vph)	552	3731		472	2719	1250	211	248	336	211	248	336
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.28		0.07	0.32	0.00	0.24	0.01	0.14	0.17	0.01	0.11

Intersection Summary

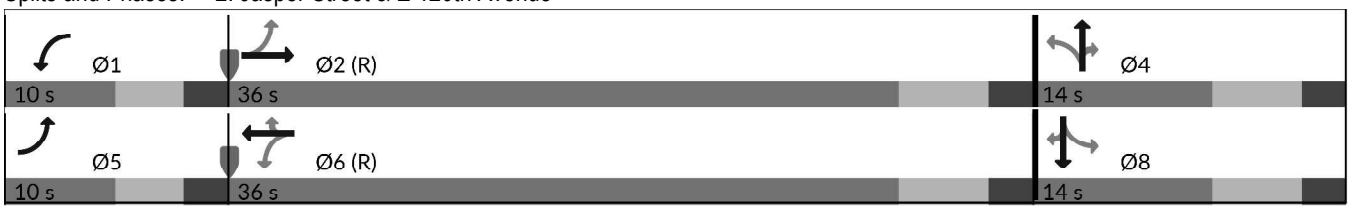
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.32

Intersection Signal Delay (s/veh): 6.8	Intersection LOS: A
Intersection Capacity Utilization 45.8%	ICU Level of Service A
Analysis Period (min) 15	

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

Splits and Phases: 2: Jasper Street & E 120th Avenue



Intersection	
Intersection Delay, s/veh	2.9
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	21	12	46	18
Demand Flow Rate, veh/h	21	12	47	18
Vehicles Circulating, veh/h	8	55	8	11
Vehicles Exiting, veh/h	21	0	21	56
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.7	2.8	2.9	2.8
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
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
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	21	12	47	18
Cap Entry Lane, veh/h	1369	1305	1369	1364
Entry HV Adj Factor	1.000	1.000	0.985	0.991
Flow Entry, veh/h	21	12	46	18
Cap Entry, veh/h	1369	1305	1348	1353
V/C Ratio	0.015	0.009	0.034	0.013
Control Delay, s/veh	2.7	2.8	2.9	2.8
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	29	2	28	19	15	16	79	899	9	9	15	477	20
Future Vol, veh/h	29	2	28	19	15	16	79	899	9	9	15	477	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	90	75	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	32	2	30	21	16	17	86	977	10	10	16	518	22

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1250	1740	270	1466	1746	493	540	0	0	987	987	0	0
Stage 1	582	582	-	1154	1154	-	-	-	-	-	-	-	-
Stage 2	668	1159	-	313	592	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	163	95	*972	108	94	521	1170	-	-	338	696	-	-
Stage 1	611	594	-	210	270	-	-	-	-	-	-	-	-
Stage 2	414	268	-	914	587	-	-	-	-	-	-	-	-
Platoon blocked, %	0	0	0	0	0		0	-	-			-	-
Mov Cap-1 Maneuver	114	83	*972	90	82	521	1170	-	-	489	489	-	-
Mov Cap-2 Maneuver	114	83	-	90	82	-	-	-	-	-	-	-	-
Stage 1	579	562	-	194	250	-	-	-	-	-	-	-	-
Stage 2	346	249	-	835	555	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	32.94	54.65	0.67	0.59
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1170	-	-	192	86	521	489	-	-
HCM Lane V/C Ratio	0.073	-	-	0.335	0.427	0.033	0.053	-	-
HCM Ctrl Dly (s/v)	8.3	-	-	32.9	74.6	12.1	12.8	-	-
HCM Lane LOS	A	-	-	D	F	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	1.4	1.7	0.1	0.2	-	-

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)	196	936	1044	369	814	11	739	71	338	23	71	102
Future Volume (vph)	196	936	1044	369	814	11	739	71	338	23	71	102
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	3433	1632	0	1770	1697	0
Flt Permitted	0.286			0.267			0.390			0.500		
Satd. Flow (perm)	533	3539	1583	497	3532	0	1409	1632	0	931	1697	0
Satd. Flow (RTOR)			196		2			343			94	
Lane Group Flow (vph)	213	1017	1135	401	897	0	803	444	0	25	188	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	7	1	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	11.0	10.0	10.0	11.0		10.0	11.0		10.0	11.0	
Total Split (s)	10.0	23.0	15.0	11.0	24.0		15.0	16.0		10.0	11.0	
Total Split (%)	16.7%	38.3%	25.0%	18.3%	40.0%		25.0%	26.7%		16.7%	18.3%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	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	0.0	
Total Lost Time (s)	5.0	6.0	5.0	5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max		None	None		None	None	
Act Effct Green (s)	23.0	17.0	33.0	25.0	18.0		21.0	16.0		11.0	5.0	
Actuated g/C Ratio	0.38	0.28	0.55	0.42	0.30		0.35	0.27		0.18	0.08	
v/c Ratio	0.69	1.01	1.18	1.20	0.85		0.97	0.65		0.10	0.83	
Control Delay (s/veh)	25.3	56.6	110.2	134.6	29.2		44.5	12.5		14.8	46.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	25.3	56.6	110.2	134.6	29.2		44.5	12.5		14.8	46.8	
LOS	C	E	F	F	C		D	B		B	D	
Approach Delay (s/veh)		79.5			61.8			33.1			43.1	
Approach LOS		E			E			C			D	
Queue Length 50th (ft)	42	~197	~478	~116	157		124	25		6	34	
Queue Length 95th (ft)	#100	#319	#698	#271	#255		#198	#165		19	#133	
Internal Link Dist (ft)		349			857			538			280	
Turn Bay Length (ft)	95		185	410			190			90		
Base Capacity (vph)	307	1002	958	334	1061		830	686		240	227	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.69	1.01	1.18	1.20	0.85		0.97	0.65		0.10	0.83	

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.20

Intersection Signal Delay (s/veh): 62.2	Intersection LOS: E
Intersection Capacity Utilization 108.4%	ICU Level of Service G
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: Chambers Road & E 120th Avenue



Intersection	
Int Delay, s/veh	94

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	67	1102	43	71	1177	23	63	6	64	20	7	48
Future Vol, veh/h	67	1102	43	71	1177	23	63	6	64	20	7	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	Free
Storage Length	150	-	-	220	-	120	55	-	165	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	73	1198	47	77	1279	25	68	7	70	22	8	52

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1279	0	0	1245	0	0	2165	2801	622	2062	2824	-
Stage 1	-	-	-	-	-	-	1367	1367	-	1434	1434	-
Stage 2	-	-	-	-	-	-	798	1434	-	628	1390	-
Critical Hdwy	4.14	-	-	5.34	-	-	6.99	6.54	7.14	6.99	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.22	-	-	3.12	-	-	3.67	4.02	3.92	3.67	4.02	-
Pot Cap-1 Maneuver	538	-	-	298	-	0	~ 36	18	368	43	17	0
Stage 1	-	-	-	-	-	0	112	213	-	138	198	0
Stage 2	-	-	-	-	-	0	336	198	-	410	208	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	538	-	-	298	-	-	~ 10	12	368	~ 12	11	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 10	12	-	~ 12	11	-
Stage 1	-	-	-	-	-	-	97	184	-	102	146	-
Stage 2	-	-	-	-	-	-	236	146	-	277	180	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0.7	1.21	$ 1653.47	$ 885.37
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	10	12	368	538	-	-	298	-	12	11	-
HCM Lane V/C Ratio	6.954	0.563	0.189	0.135	-	-	0.259	-	1.782	0.681	-
HCM Ctrl Dly (s/v)	$ 3424.3	$ 515	17	12.7	-	-	21.3	-	$ 993.2	$ 577.4	0
HCM Lane LOS	F	F	C	B	-	-	C	-	F	F	A
HCM 95th %tile Q(veh)	9.9	1.3	0.7	0.5	-	-	1	-	3.5	1.5	-

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)	67	1102	43	71	1177	23	63	6	64	20	7	48
Future Volume (vph)	67	1102	43	71	1177	23	63	6	64	20	7	48
Satd. Flow (prot)	1770	5055	0	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.158			0.196			0.752			0.753		
Satd. Flow (perm)	294	5055	0	365	3539	1583	1401	1863	1583	1403	1863	1583
Satd. Flow (RTOR)		14				145			145			145
Lane Group Flow (vph)	73	1245	0	77	1279	25	68	7	70	22	8	52
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	4	4	4	8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	11.0		10.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Total Split (s)	10.0	37.0		10.0	37.0	37.0	13.0	13.0	13.0	13.0	13.0	13.0
Total Split (%)	16.7%	61.7%		16.7%	61.7%	61.7%	21.7%	21.7%	21.7%	21.7%	21.7%	21.7%
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	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	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0		5.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	41.6	38.8		41.6	38.8	38.8	6.7	6.7	6.7	6.7	6.7	6.7
Actuated g/C Ratio	0.69	0.65		0.69	0.65	0.65	0.11	0.11	0.11	0.11	0.11	0.11
v/c Ratio	0.22	0.38		0.21	0.56	0.02	0.44	0.03	0.23	0.14	0.04	0.17
Control Delay (s/veh)	6.7	8.0		4.4	9.9	0.0	34.2	24.0	2.3	26.2	24.1	1.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	6.7	8.0		4.4	9.9	0.0	34.2	24.0	2.3	26.2	24.1	1.2
LOS	A	A		A	A	A	C	C	A	C	C	A
Approach Delay (s/veh)		7.9			9.4			18.3			10.2	
Approach LOS		A			A			B			B	
Queue Length 50th (ft)	9	81		7	168	0	23	2	0	7	3	0
Queue Length 95th (ft)	m9	m85		16	235	0	57	12	5	26	13	0
Internal Link Dist (ft)		313			358			568			326	
Turn Bay Length (ft)	150			220		120	55		165	75		75
Base Capacity (vph)	330	3277		373	2291	1075	163	217	312	163	217	312
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.38		0.21	0.56	0.02	0.42	0.03	0.22	0.13	0.04	0.17

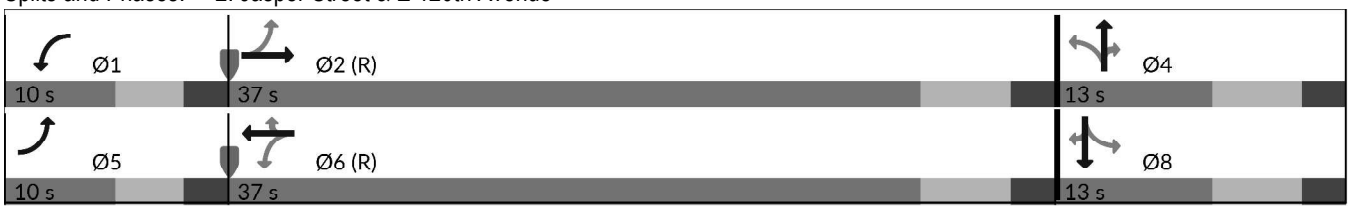
Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay (s/veh): 9.2	Intersection LOS: A
Intersection Capacity Utilization 61.0%	ICU Level of Service B
Analysis Period (min) 15	

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

Splits and Phases: 2: Jasper Street & E 120th Avenue



Intersection	
Intersection Delay, s/veh	3.2
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	49	2	53	91
Demand Flow Rate, veh/h	50	2	54	93
Vehicles Circulating, veh/h	59	80	40	16
Vehicles Exiting, veh/h	50	14	69	66
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.1	2.8	3.1	3.3
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
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
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	50	2	54	93
Cap Entry Lane, veh/h	1299	1272	1325	1358
Entry HV Adj Factor	0.979	1.000	0.987	0.979
Flow Entry, veh/h	49	2	53	91
Cap Entry, veh/h	1272	1272	1307	1329
V/C Ratio	0.038	0.002	0.041	0.069
Control Delay, s/veh	3.1	2.8	3.1	3.3
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	27	4	59	15	28	20	97	1105	21	13	34	1483	27
Future Vol, veh/h	27	4	59	15	28	20	97	1105	21	13	34	1483	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	90	75	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	4	64	16	30	22	105	1201	23	14	37	1612	29

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	2555	3164	821	2334	3167	612	1641	0	0	1224	1224	0	0
Stage 1	1729	1729	-	1423	1423	-	-	-	-	-	-	-	-
Stage 2	827	1435	-	910	1743	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	~ 13	6	*694	*24	~ 6	436	490	-	-	238	565	-	-
Stage 1	164	201	-	*143	200	-	-	-	-	-	-	-	-
Stage 2	332	198	-	*654	196	-	-	-	-	-	-	-	-
Platoon blocked, %	0	0	0	0	0		0	-	-			-	-
Mov Cap-1 Maneuver	-	~ 4	*694	-	~ 4	436	490	-	-	400	400	-	-
Mov Cap-2 Maneuver	-	~ 4	-	-	~ 4	-	-	-	-	-	-	-	-
Stage 1	143	176	-	*112	157	-	-	-	-	-	-	-	-
Stage 2	200	155	-	*505	171	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v			1.14	0.46
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	490	-	-	-	-	436	400	-	-
HCM Lane V/C Ratio	0.215	-	-	-	-	0.05	0.128	-	-
HCM Ctrl Dly (s/v)	14.3	-	-	-	-	13.7	15.3	-	-
HCM Lane LOS	B	-	-	-	-	B	C	-	-
HCM 95th %tile Q(veh)	0.8	-	-	-	-	0.2	0.4	-	-

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

APPENDIX D

Warrant Analysis Forms

engineering study, but it is not intended to be the only factor or even the overriding consideration. Agencies can install a traffic control signal at a location where no warrants are met, but only after conducting an engineering study that documents the rationale for deciding that the installation of a traffic control signal is the best solution for improving the overall safety and/or operation at the location.

Section 4C.02 Warrant 1, Eight-Hour Vehicular Volume

Support:

01 The Minimum Vehicular Volume, Condition A (see Table 4C-1), is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

02 The Interruption of Continuous Traffic, Condition B (see Table 4C-1), is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

03 It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and an analysis of the combination of Conditions A and B is not needed.

Guidance:

04 *The need for a traffic control signal should be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:*

A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major street and the more critical minor-street approach, respectively, to the intersection; or

B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major street and the more critical minor-street approach, respectively, to the intersection.

Standard:

05 **These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours that are selected for the Condition A analysis shall not be required to be the same 8 hours that are selected for the Condition B analysis.**

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on more critical minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on more critical minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

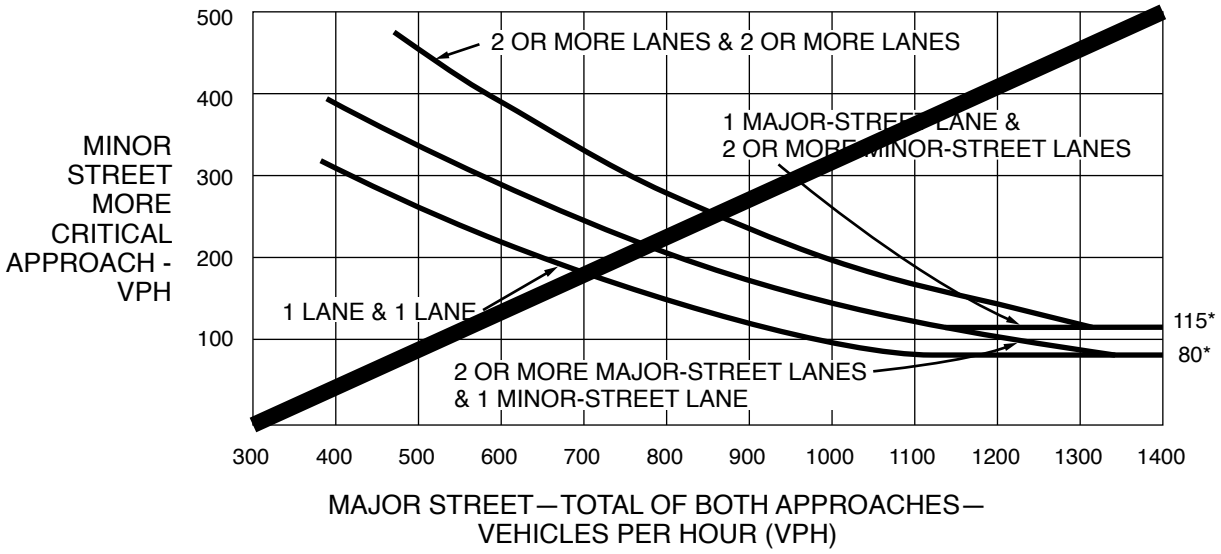
[a] Basic minimum hourly volume

[b] Used for combination of Conditions A and B after adequate trial of other remedial measures

[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume

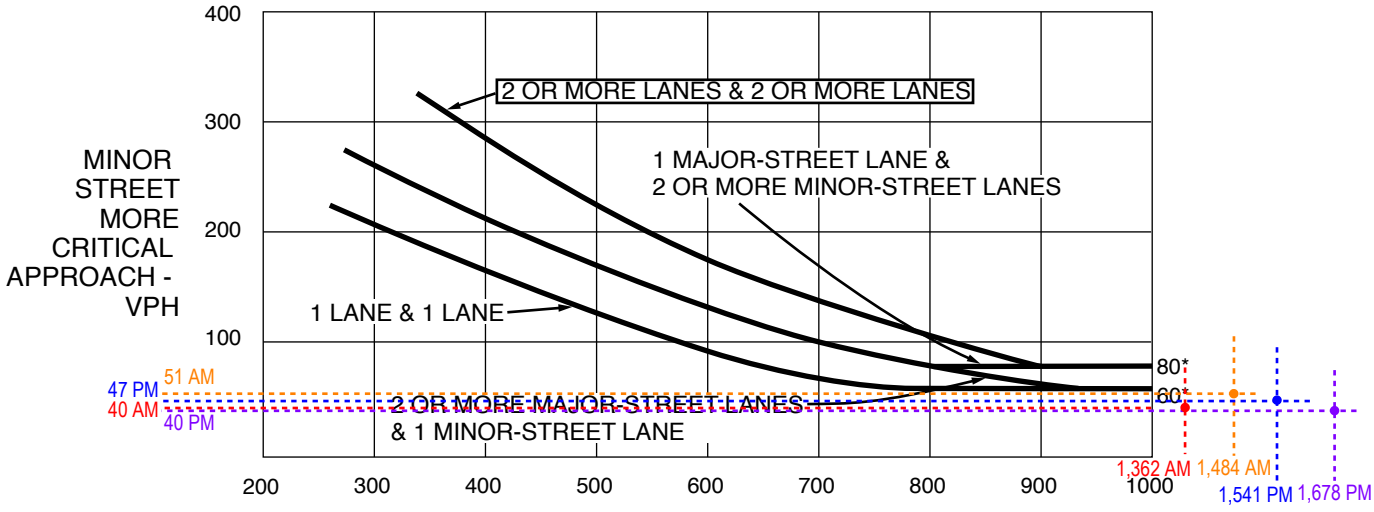


*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

JASPER STREET

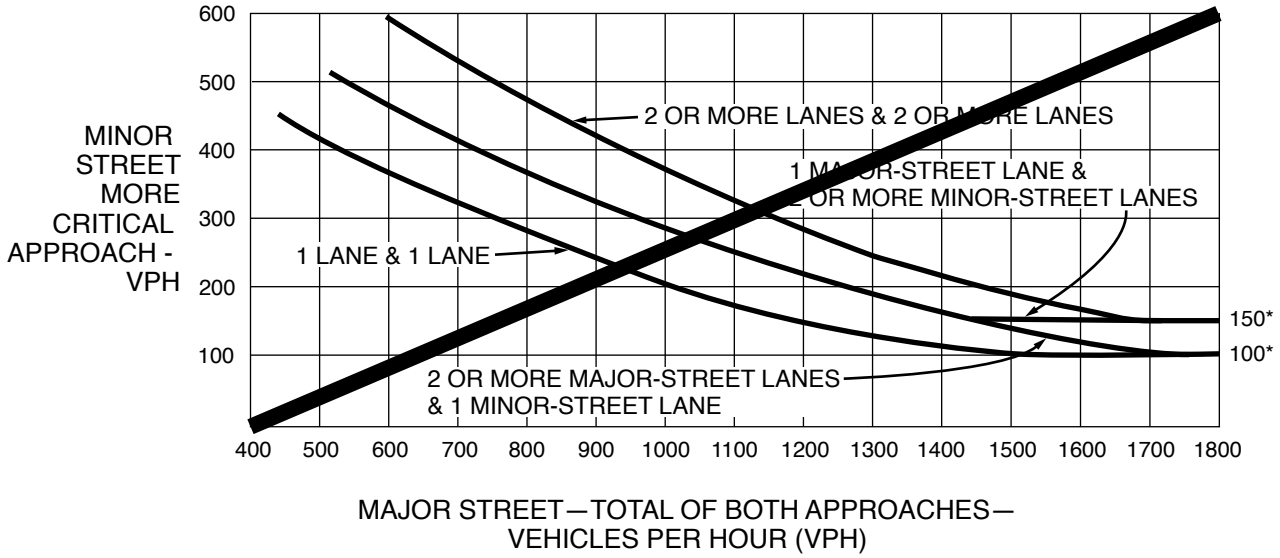


*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane

Key:
7:00 AM - 8:00 AM
8:00 AM - 9:00 AM
4:00 PM - 5:00 PM
5:00 PM - 6:00 PM

E 120TH AVENUE (45 MPH)

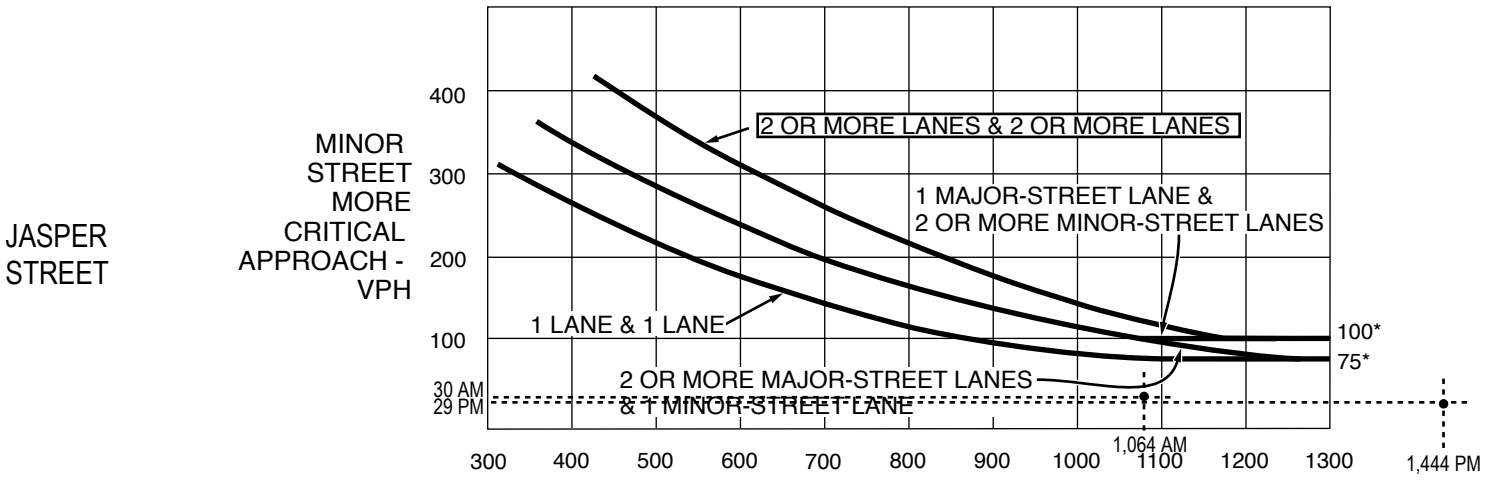
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

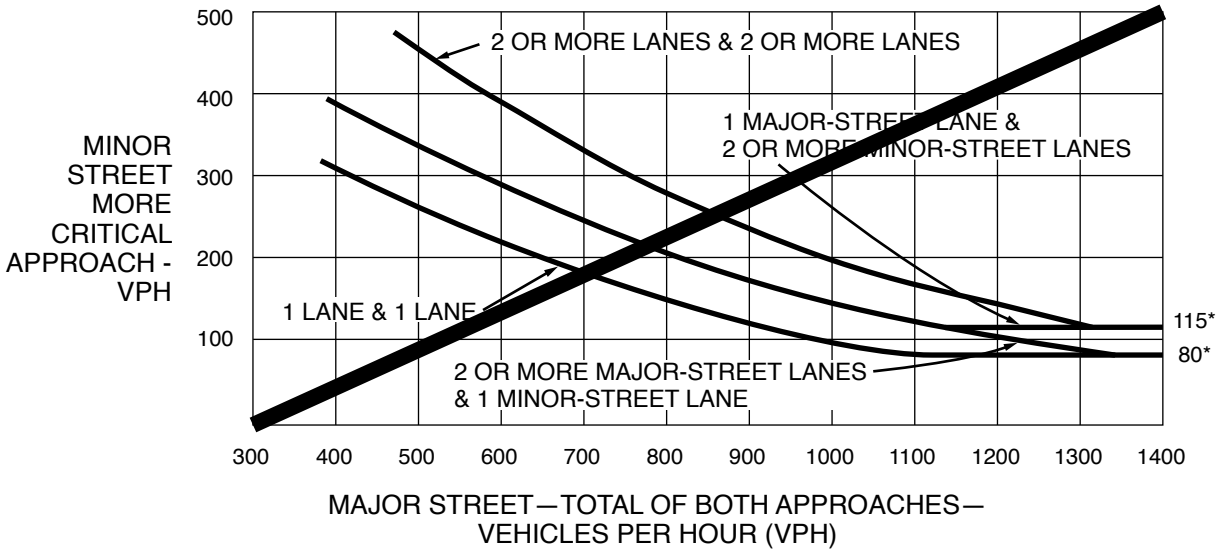
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane

Note: 50% right turn reduction applied.

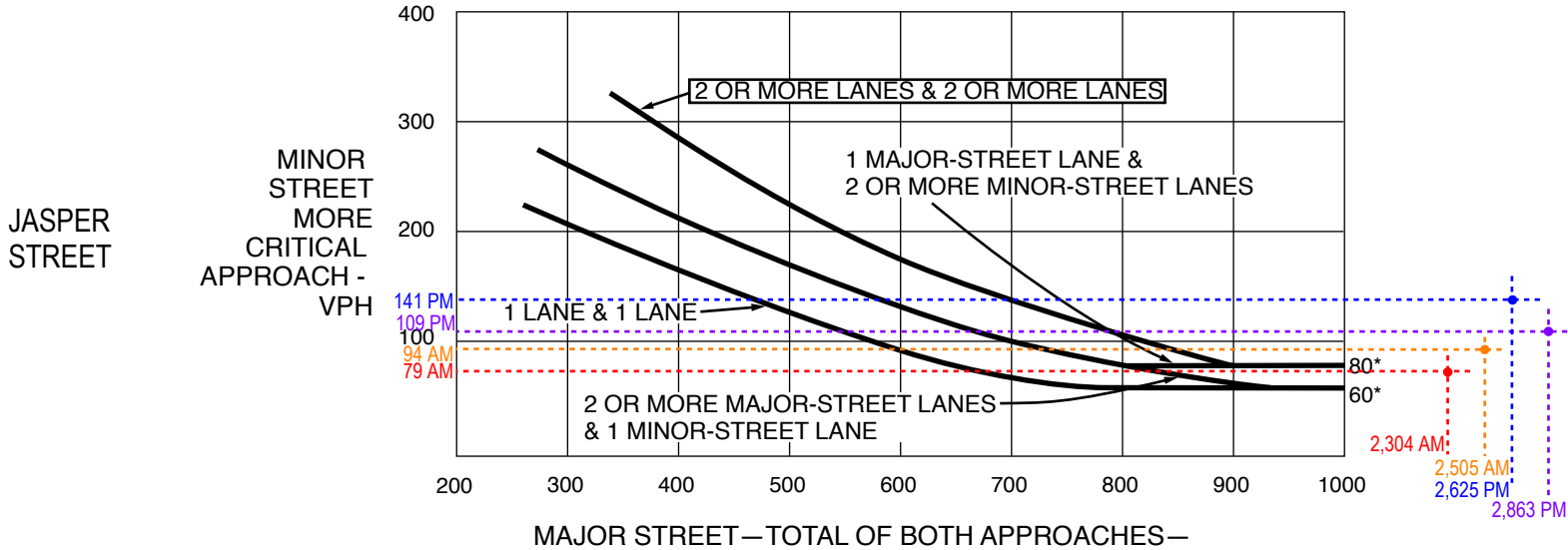
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

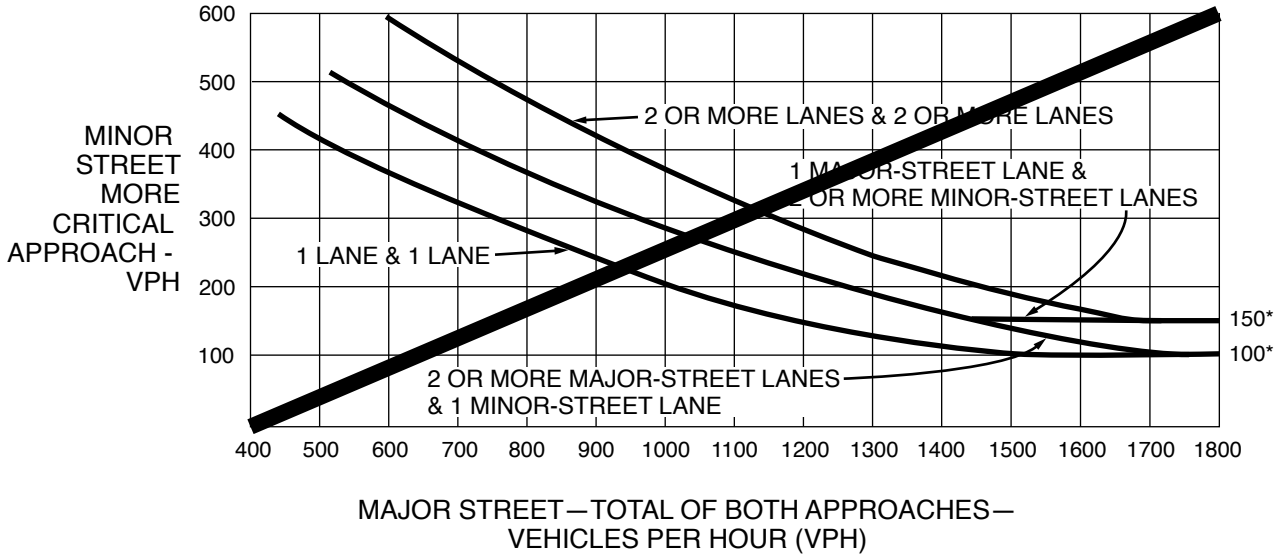


*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane

Key:
7:00 AM - 8:00 AM
8:00 AM - 9:00 AM
4:00 PM - 5:00 PM
5:00 PM - 6:00 PM

E 120TH AVENUE (45 MPH)

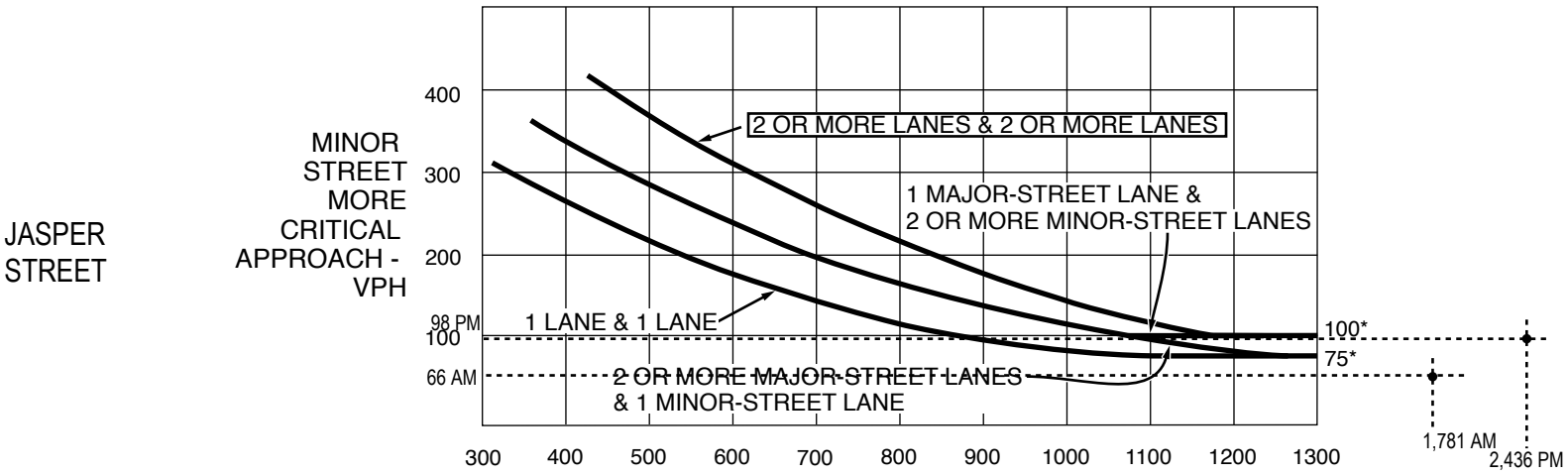
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

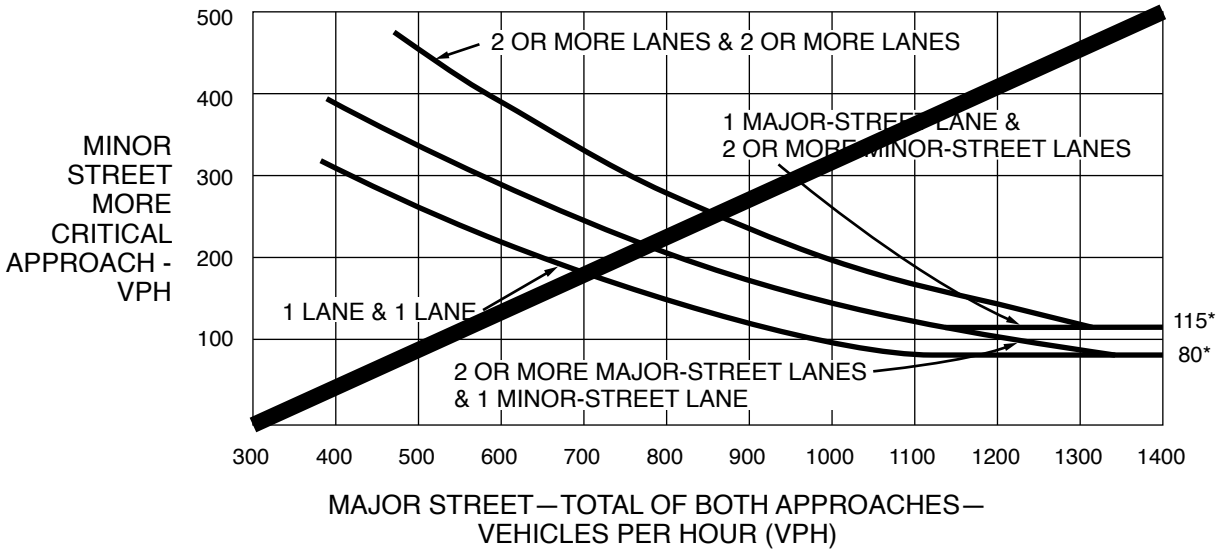


*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane

E 120TH AVENUE (45 MPH)

Note: 50% right turn reduction applied.

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

JASPER STREET

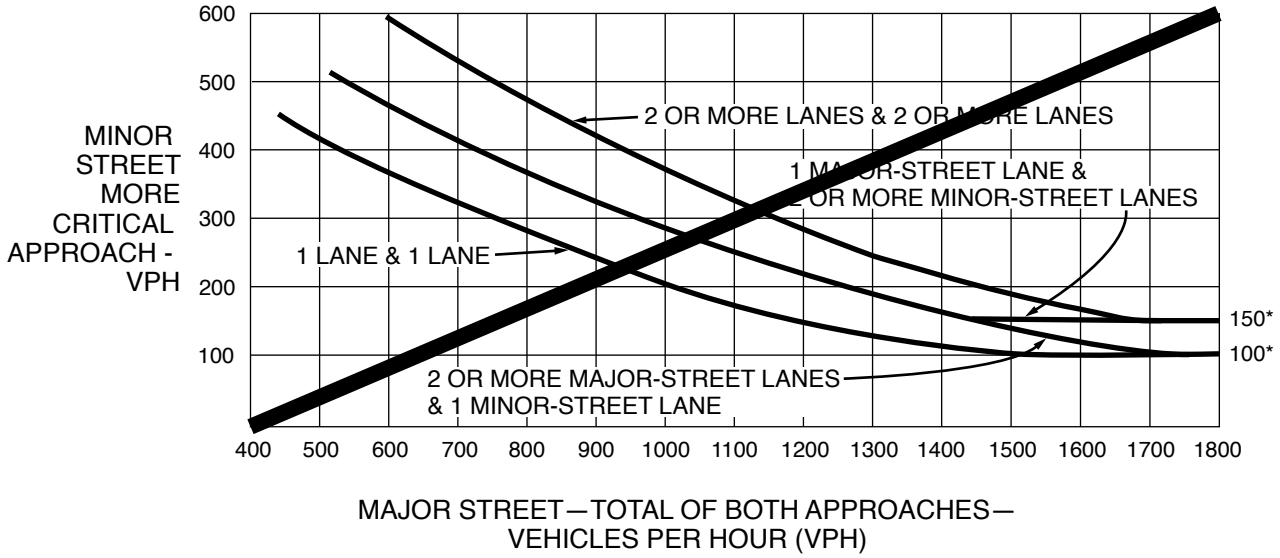


*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane

Key:
7:00 AM - 8:00 AM
8:00 AM - 9:00 AM
4:00 PM - 5:00 PM
5:00 PM - 6:00 PM

E 120TH AVENUE (45 MPH)

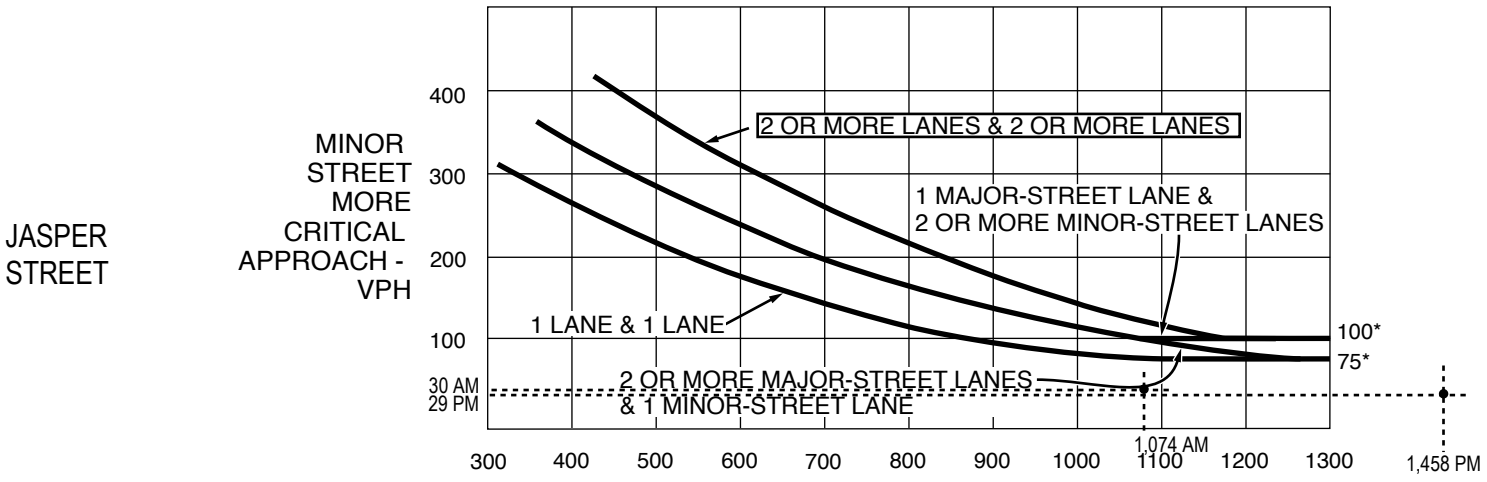
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

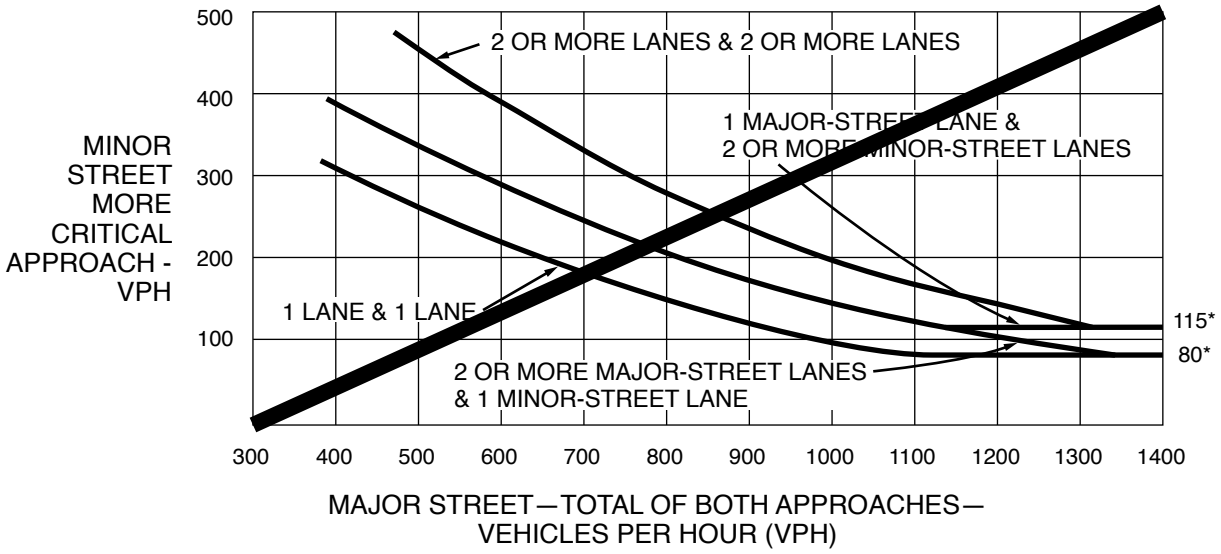


*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane

E 120TH AVENUE (45 MPH)

Note: 50% right turn reduction applied.

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume

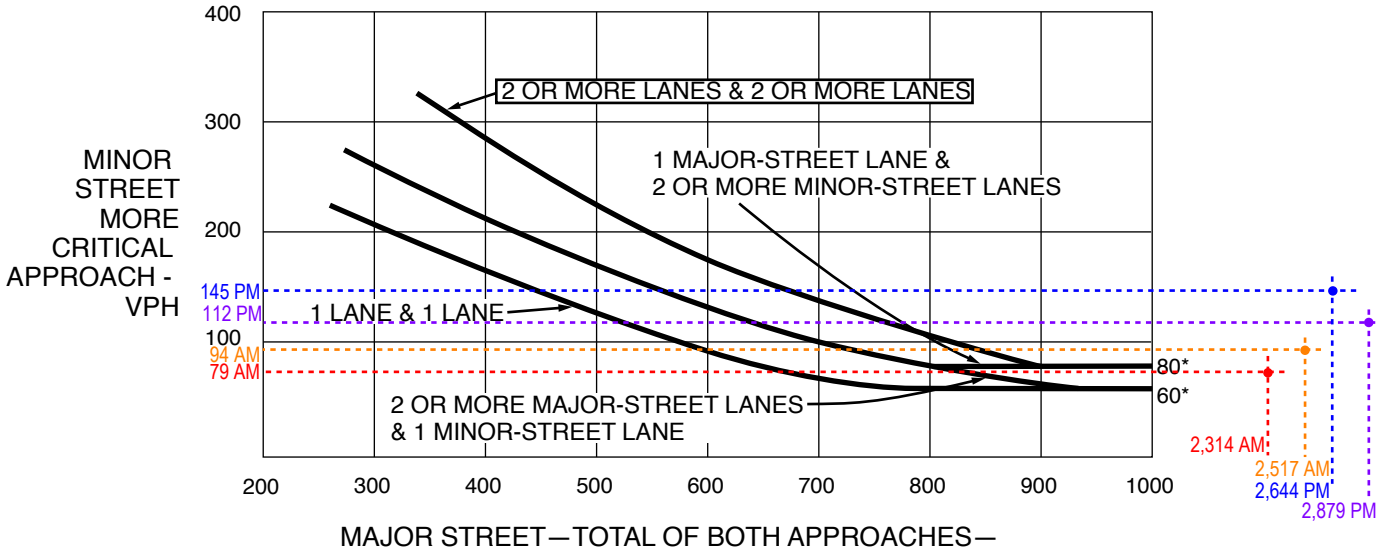


*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

JASPER STREET

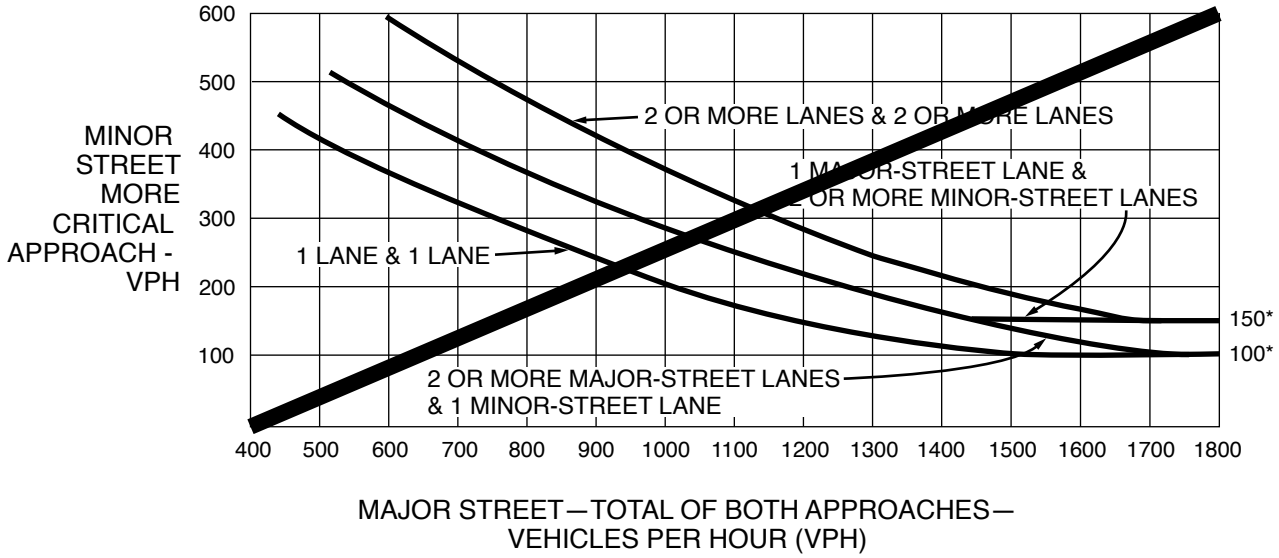


*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane

Key:
7:00 AM - 8:00 AM
8:00 AM - 9:00 AM
4:00 PM - 5:00 PM
5:00 PM - 6:00 PM

E 120TH AVENUE (45 MPH)

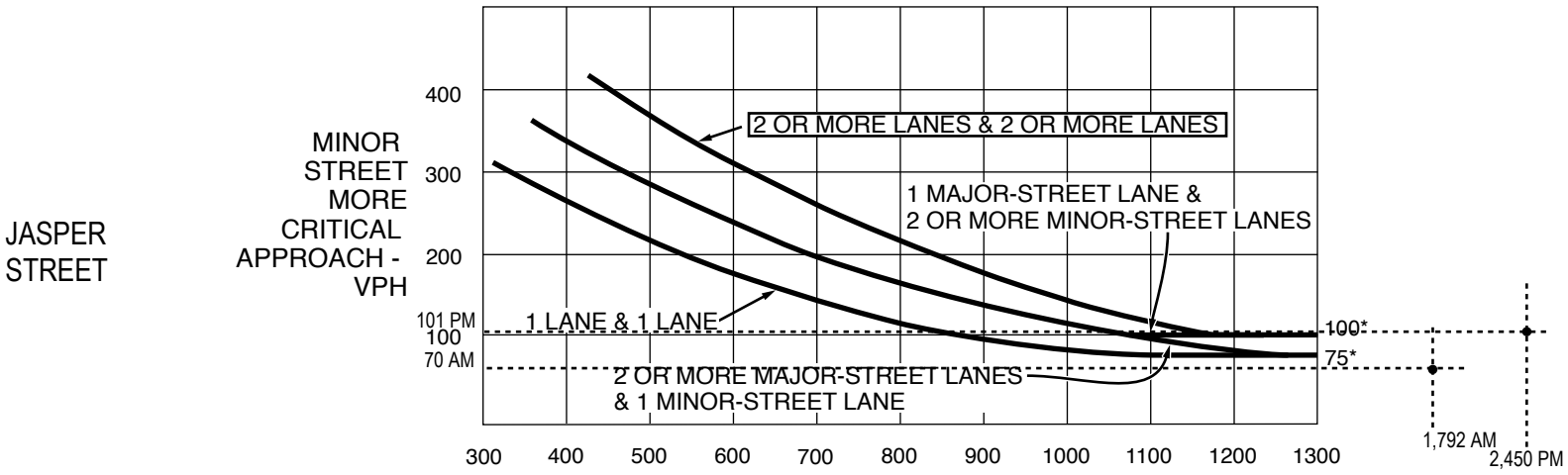
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane

E 120TH AVENUE (45 MPH)

Note: 50% right turn reduction applied.