

Chambers Road Apartments Traffic Impact Study

City of Commerce City



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Submitted To:

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1.0 EXECUTIVE SUMMARY

This traffic impact study has been prepared by the Fox Tuttle Transportation Group for the Chambers Road Apartments project. The project proposes to develop multifamily residential use on a ±12.7-acre site in the City of Commerce City. The project parcel is located along the west side of Chambers Road approximately 1,000' south of E. 104th Avenue. The purpose of this study is to assist the City in identifying potential traffic impacts within the study area with buildout of this project in the short-term (Year 2027) and long-term, 20-year (Year 2044) planning horizons.

The project is proposing to construct 283 apartment units on the site. Access is proposed via an extension of E. 102nd Avenue west from Chambers Road, with two (2) access points into the project site from E. 102nd Avenue: 1) full-movement access located approximately 370' west of Chambers Road and, 2) full-movement access aligning with Altura Street approximately 1,200' west of Chambers Road.

The Chambers Road Apartments project is anticipated to generate 1,907 daily, 113 AM peak hour, and 144 PM peak hour trips at buildout. These volumes will be distributed along Chambers Road north (to/from E. 104th Avenue) and south (to/from E. 96th Avenue) and along E. 102nd Avenue, which will connect to Sable Blvd. with a temporary connection from this project to be improved to its ultimate design west of the project site with the development of Anderson Ranch.

Based on the projected rate of background (non-project) within the study area, it is anticipated that the following background (non-project related) improvements will need to be in place by the Year 2044 scenario to service existing volumes and future area growth at acceptable Levels of Service per City criteria:

Long-Term (Year 2044) Background (non-project related) Improvement Recommendations:

- If future regional growth projections are realized, the intersection of E. 104th Avenue & Chambers Road will need to be constructed to its buildout lane geometry, with three (3) through lanes in each direction eastbound and westbound on E. 104th Avenue and exclusive right-turn lanes added on the eastbound, northbound and southbound approaches.
- If future regional growth projections are realized, the intersection of E. 96th Avenue & Chambers Road will need to be constructed to its buildout lane geometry, with two (2) through lanes in each direction eastbound and westbound on E. 96th Avenue.

- Roadway improvements identified by the adjacent Anderson Ranch project were assumed to be implemented in the background for this study. Those improvements include:
 - Install traffic signal control at E. 104th Avenue and Sable Boulevard. Extend northbound left turn storage at the intersection to 125 feet.
 - Add eastbound, northbound, and southbound left turn auxiliary lanes and southbound right turn auxiliary lane at E. 100th Avenue and Chambers Road. Install traffic signal control at the intersection.
 - Extend eastbound left turn storage at E. 96th Avenue & Chambers Road to 450 feet. Extend southbound right turn storage at E. 96th Avenue & Chambers Road to 275 feet.

The project-added traffic can be accommodated on the existing and proposed roadway and intersection network with the following recommended improvements in place:

Project-Related Improvement Recommendations (Responsibility of the Developer):

- Extend E. 102nd Avenue from Chambers to the west along the project frontage. This roadway should be built consistent with the City's "Minor/Residential Collector" standards per the C3 Vision Transportation Plan Roadway Classification Plan. A temporary connection of E. 102nd Avenue will be constructed between the west edge of the project site to Sable Boulevard.
- The intersection of E. 102nd Avenue should include a northbound left-turn deceleration lane (175' lane + 180' taper) and a southbound right-turn deceleration lane (135' + 180'), consistent with the City of Commerce City Engineering Construction Standards and Specifications. The eastbound approach should be striped with a 75' left turn lane.
- Construct the east access to the site along E. 102nd Avenue with side-street stop-sign control on the southbound approach. No auxiliary turn lanes are required or recommended at this access given the Minor Collector roadway classification, consistent with City standards.
- Construct the west access to the site along E. 102nd Avenue to align with Altura Street, with side-street stop-sign control on the northbound and southbound approaches. No auxiliary turn lanes are required or recommended at this access given the Minor Collector roadway classification, consistent with City standards.

CHAMBERS ROAD APARTMENTS TRAFFIC IMPACT STUDY

2.0 INTRODUCTION

This traffic impact study has been prepared by the Fox Tuttle Transportation Group for the Chambers Road Apartments project in the City of Commerce City. The project proposes to construct 283 apartment units. The project parcel is located in the northwest quadrant of Chambers Road and E. 102nd Avenue alignment, approximately 1,000 feet south of E. 104th Avenue.

The purpose of this study is to assist in identifying potential traffic impacts within the study area with buildout of this project in the short-term (Year 2027) and long-term (Year 2044) scenarios. The traffic study addresses peak hour intersection conditions in the study area without and with the project added traffic. The information contained in this study is anticipated to be used by the City of Commerce City in identifying any intersection or roadway deficiencies and potential improvements for both the near term and long-term future scenarios.

3.0 PROJECT DESCRIPTION

The project is proposing to develop 283 apartment units on a ±12.7-acre site which currently has a single residential use. The project proposes to extend E. 102nd Avenue along the project's southern frontage. Access to the site is proposed, as follows:

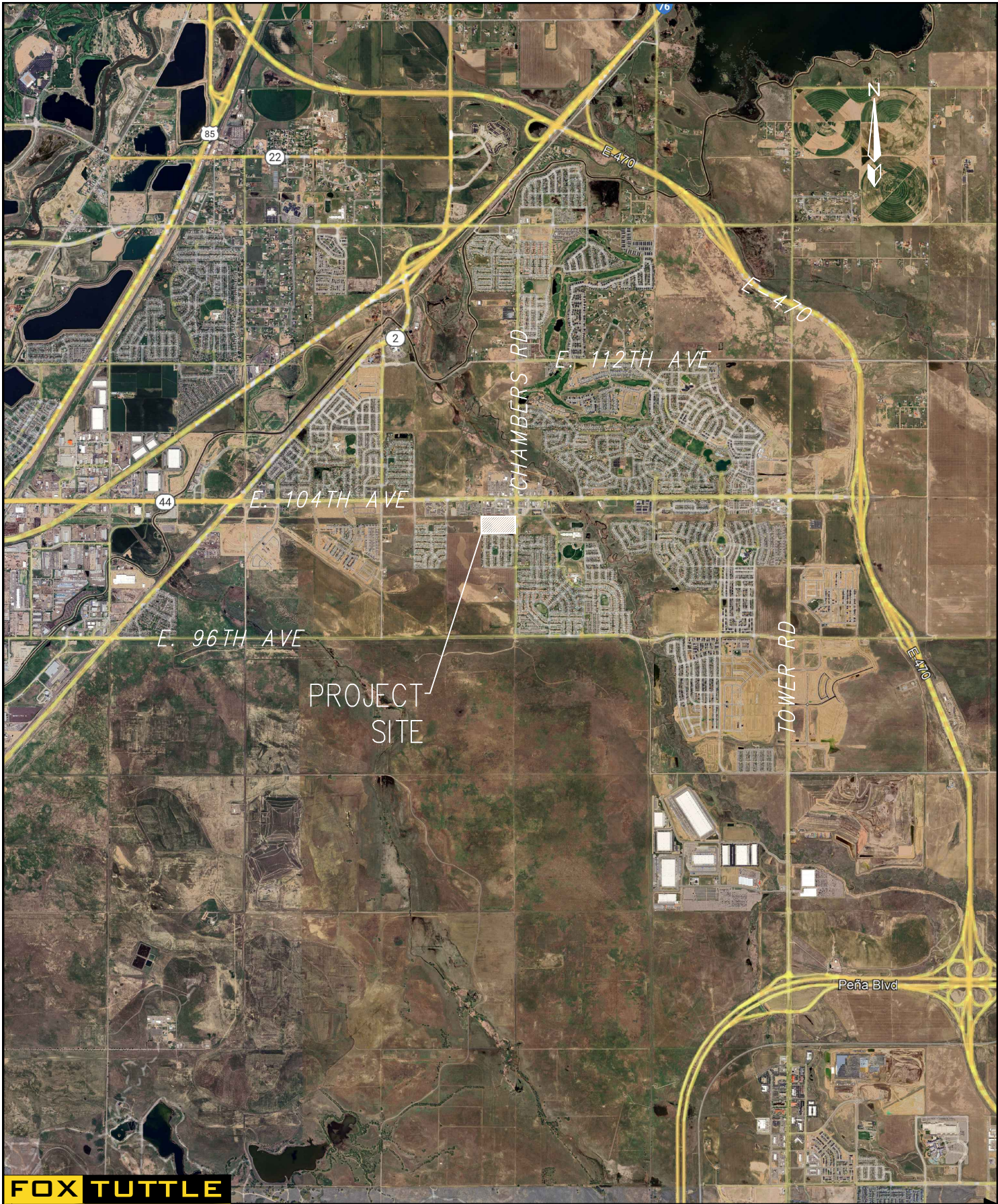
- Full-movement access along E. 102nd Avenue approximately 370' west of Chambers Road
- Full-movement access aligning with Altura Street approximately 1,200' west of Chambers Road

Development of the project includes construction of the E. 102nd Avenue & Chambers Road intersection as a full-movement, side-street stop-sign controlled intersection, which will provide access to the project via Chambers Road. Additional access to the site to the west will be provided via a temporary connection of E. 102nd Avenue to Sable Boulevard to be improvement the ultimate configuration with development of the Anderson Ranch project.

The project site is within the "Northern Neighborhoods" character area per the Commerce City 2045 Comprehensive Plan. The proposed use is consistent with this character area. Adjacent land uses include existing single-family residential use to the south in the Harvest Meadows

neighborhood, future attached and detached single-family residential uses to the south and west in the Anderson Ranch neighborhood, and multifamily apartments and mixed-use commercial to the north of the site.

A vicinity map is shown on **Figure 1**. A concept site plan depicting the proposed access points is shown on **Figure 2**.



A PART OF THE SOUTH HALF (S1/2) OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION EIGHTEEN (18) TOWNSHIP TWO (2) SOUTH, RANGE SIXTY-SIX (66) WEST OF THE 6TH P.M. CASE # (D24-0006).
PARCEL #0172300000150



- Proposed Full-Movement Access on E. 102nd Ave (East Access)

FOX TUTTLE
TRANSPORTATION GROUP

4.0 EXISTING AND FUTURE BACKGROUND TRAFFIC CONDITIONS

4.1 Study Area and Circulation Network

The study area boundaries took into consideration the amount of traffic to be generated by the project and potential impact to the existing and proposed roadway network.

The existing study area street network consists of arterial, collector and local streets. The primary public roadways that will provide access to the project site are discussed in the following text. Roadway classifications discussed are consistent with the City of Commerce City C3 Vision Transportation Plan¹. The existing study area roadway network is illustrated on **Figure 1**.

Chambers Road is a two-lane “Multimodal Arterial” providing north-south access through the study area, extending from E. 96th Avenue to the south to E. 120th Avenue to the north. Chambers Road has a posted speed of 40 miles per hour (mph) adjacent to the project site. There exists a 12’ concrete multi-use path along the east side of Chambers Road between E. 96th Avenue and E. 104th Avenue and a 6’ detached sidewalk on the west side of Chambers Road extending from roughly 200’ north of the site to E. 104th Avenue. Chambers Road widens to a four-lane section with auxiliary lanes north of the site within commercial areas adjacent to E. 104th Avenue. The current limits of the four-lane section were assumed to remain the same for future conditions in this study.

E. 104th Avenue is a four-lane, “Principal Arterial” roadway that provides east-west access north of the project site, extending from E. 470 on the east to US 36 and Westminster to the west. E. 104th Avenue has a posted speed of 45 mph within the study area. The Chambers Road & E. 104th Avenue intersection is controlled with a traffic signal. The C3 Vision Transportation Plan identifies E. 104th Avenue to be built to six (6) lanes at buildout, with three (3) through lanes in each direction, in addition to auxiliary turn lanes. Transit service exists on E. 104th Avenue at Chambers Road via the RTD 104L route, which provides access between Wagon Road Park-n-Ride and Denver Airport Station, with connectivity to other regional routes.

E. 96th Avenue is a two-lane, “Minor Arterial” roadway that provides east-west access south of the project site, extending from E. 470 on the east to I-76 to the west. E. 96th Avenue has a posted speed of 30 mph within the study area. The Chambers Road & E. 96th Avenue intersection is controlled with a traffic signal. The C3 Vision Transportation Plan identifies E. 96th Avenue to be built to four (4) lanes at buildout, with two (2) through lanes in each direction, in addition to auxiliary turn lanes.

¹ C3 Vision Transportation Plan. City of Commerce City. July 2010.

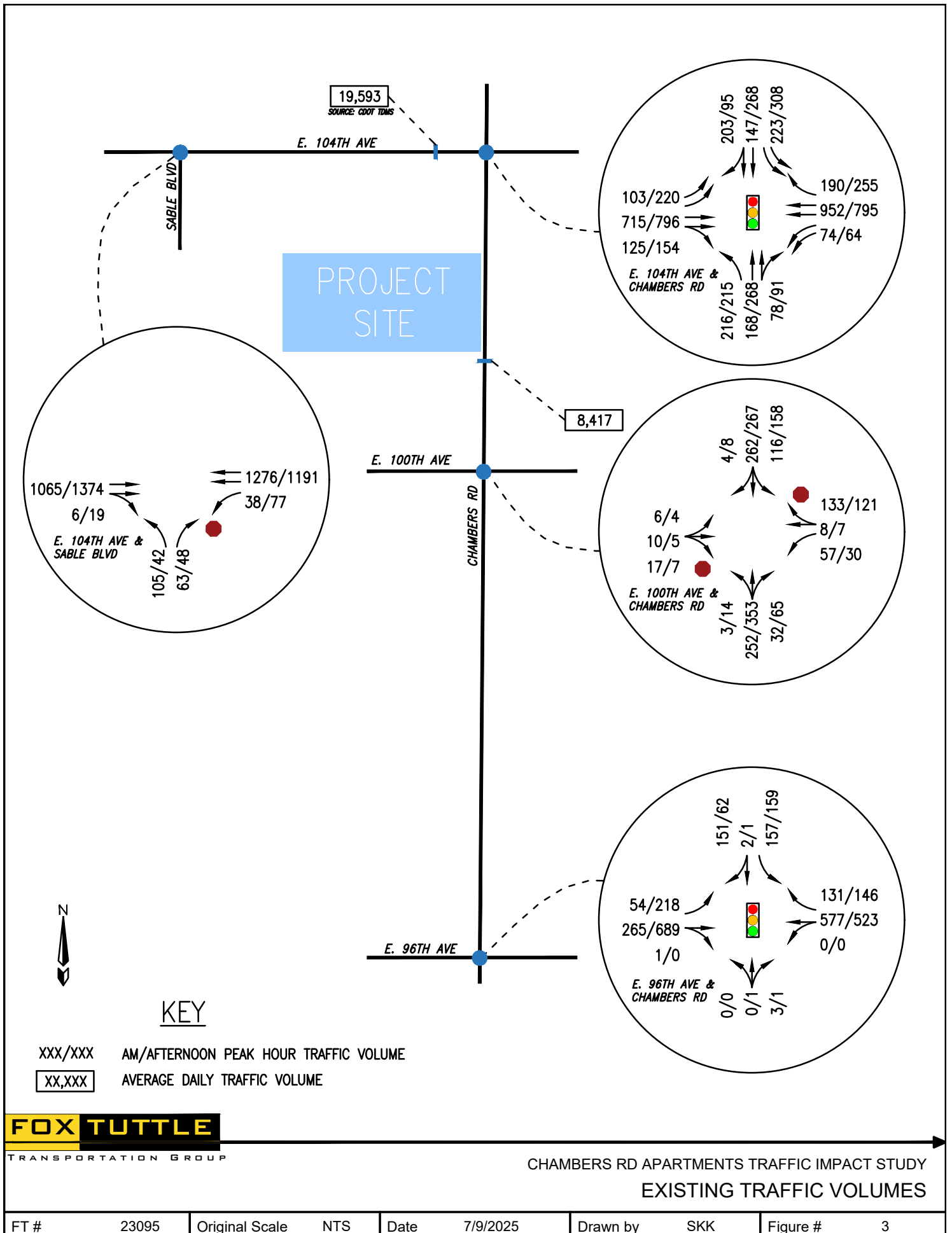
E. 102nd Avenue is a two-lane “Minor/Residential Collector” roadway that will provide east-west access to existing and proposed residential land uses in the immediate project site area. Only a short segment of E. 102nd Avenue exists today, on the north border of the existing Harvest Meadows neighborhood to the south of the project site. The Chambers Road Apartments project proposes to construct the full section of E. 102nd Avenue, extending from Chambers Road to the west along the project’s southern frontage. This roadway will be a two-lane street consistent with the C3 Vision Transportation Plan. The project will also build a two-lane temporary section of E. 102nd Avenue from the west edge of the project to Sable Boulevard. With development of the adjacent Anderson Ranch project, E. 102nd Avenue will be improved to Sable Blvd to the west with the full planned roadway design.

E. 100th Avenue is a two-lane “Minor/Residential Collector” roadway that provides east-west access in the project area. The adjacent Anderson Ranch project will complete the missing south half of E. 100th Avenue west of Chambers Road and extend E. 100th Avenue to Sable Boulevard. Anderson Ranch also plans to install traffic signal control

Sable Boulevard is a two-lane “Minor/Residential Collector” roadway that provides north-south access to developments south of 104th Avenue. The adjacent Anderson Ranch project will extend Sable Boulevard from its current limits south to 98th Avenue (also to be built by Anderson Ranch). Anderson Ranch also plans to install traffic signal control at E. 104th Avenue & Sable Boulevard and extend the northbound auxiliary lane storage.

4.2 Existing Traffic Volumes

Weekday AM and PM peak hour traffic volumes and daily traffic volumes were collected at study area intersections in November 2023. The existing traffic volumes are illustrated on **Figure 3**, along with the existing intersection geometry and traffic controls. Count data sheets are provided in the Appendix.



4.3 Annual Growth Factor and Future Volume Methodology

Potential for background (non-project) traffic growth in the study area was considered based on a review of Denver Regional Council of Governments (DRCOG) regional travel model projections and Colorado Department of Transportation (CDOT) growth factors. Additional trip projections from the adjacent Anderson Ranch Traffic Impact Study (Kimley-Horn, January 2023) were also incorporated. Using the DRCOG 2050 model projections vs. 2020 base-year data, it was determined that an average 2.1% annual background growth would effectively represent traffic volume growth along Chambers Road and at study area intersections over the next 20 years, with the site-specific projections of the Anderson Ranch buildout added on top of this ambient growth.

Using this methodology, the Year 2027 (short-term planning horizon) and Year 2044 background (without project) traffic volumes are provided on **Figure 4** and **Figure 5**, respectively.

4.4 Existing, Year 2027 Background, and Year 2044 Background Capacity Analysis

Existing, Year 2027 and Year 2044 traffic scenarios *without* development of the project were analyzed to provide a baseline for future year comparison.

In determining the operational characteristics of an intersection, “Levels of Service” (LOS) A through F are applied, with LOS A indicating very good operations and LOS F indicating congested operations. The intersection LOS is represented as a delay in seconds per vehicle for the intersection as a whole and for each turning movement. A more detailed discussion of LOS methodology is contained in the Appendix for reference. Criteria contained in the Highway Capacity Manual (HCM), using Synchro software, was applied for these analyses in order to determine LOS and 95th-percentile queues during peak hour periods. Traffic signal phasing and timing operations were obtained from City staff and incorporated into the modeling.

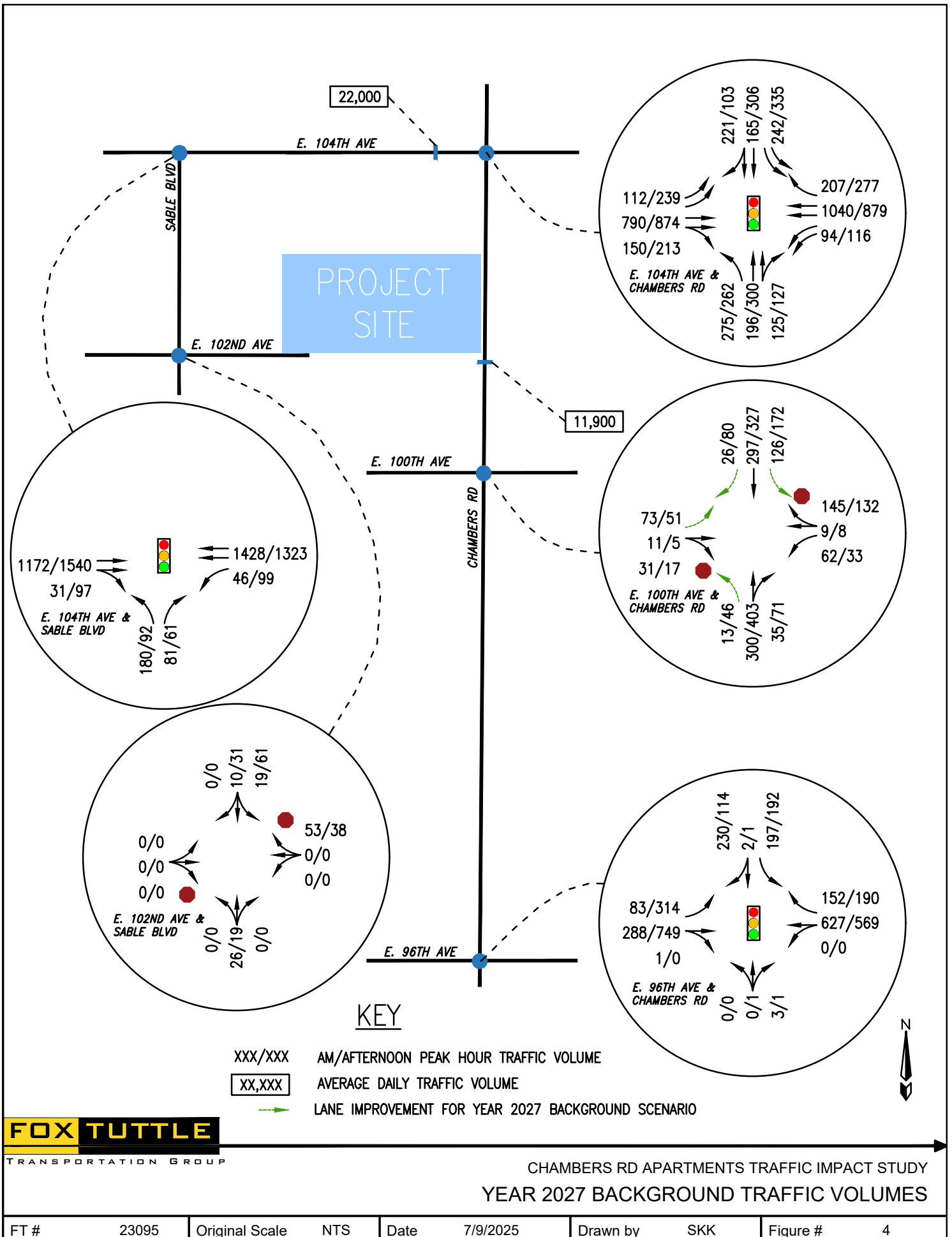
The results of the LOS and queue calculations for the baseline traffic scenarios (without project) are summarized on **Table 1**. The intersection LOS and queue worksheets are attached in the Appendix. The data in the tables shows that all study intersections are operating acceptably and will continue to operate acceptably (overall LOS D or better) in the AM and PM peak hours for all existing, short-term and long-term background scenarios.

Some individual left-turn movements are shown to operate at LOS E or F in existing and future scenarios. This level of delay is typical of protected-only left-turn operation with a long (120-second) cycle length, and is in place to maximize safety. The westbound left-turn and through movement at E. 96th Avenue and Chambers Road is calculated to operate at LOS F in the PM

peak hour under existing conditions and is estimated to continue to operate at LOS F in the PM peak hour in Year 2027 Background.

The following background (non-project related) long-term future roadway improvements were identified as necessary to maintain LOS D or better overall for the Year 2044 scenario:

- E. 104th Avenue & Chambers Road will need to be widened to its buildout lane geometry, with three (3) through lanes in each direction eastbound and westbound on E. 104th Avenue and exclusive right-turn lanes added on the eastbound, northbound and southbound approaches; queues are estimated to remain within available storage length.
- E. 96th Avenue & Chambers Road will need to be widened to its buildout lane geometry, with two (2) through lanes in each direction eastbound and westbound on E. 96th Avenue; in addition, the queue analysis shows the eastbound left-turn and southbound left-turn storage lengths should be extended as the intersection is improved to accommodate existing and future queues.
- E. 100th Avenue & Chambers Road will need to be signalized and widened to its buildout lane geometry, with dedicated eastbound, northbound, and southbound left-turn lanes and a southbound right-turn lane.
- E. 104th Avenue & Sable Boulevard will need to be signalized and the northbound left-turn storage should be extended as the intersection is improved to accommodate existing and future queues.



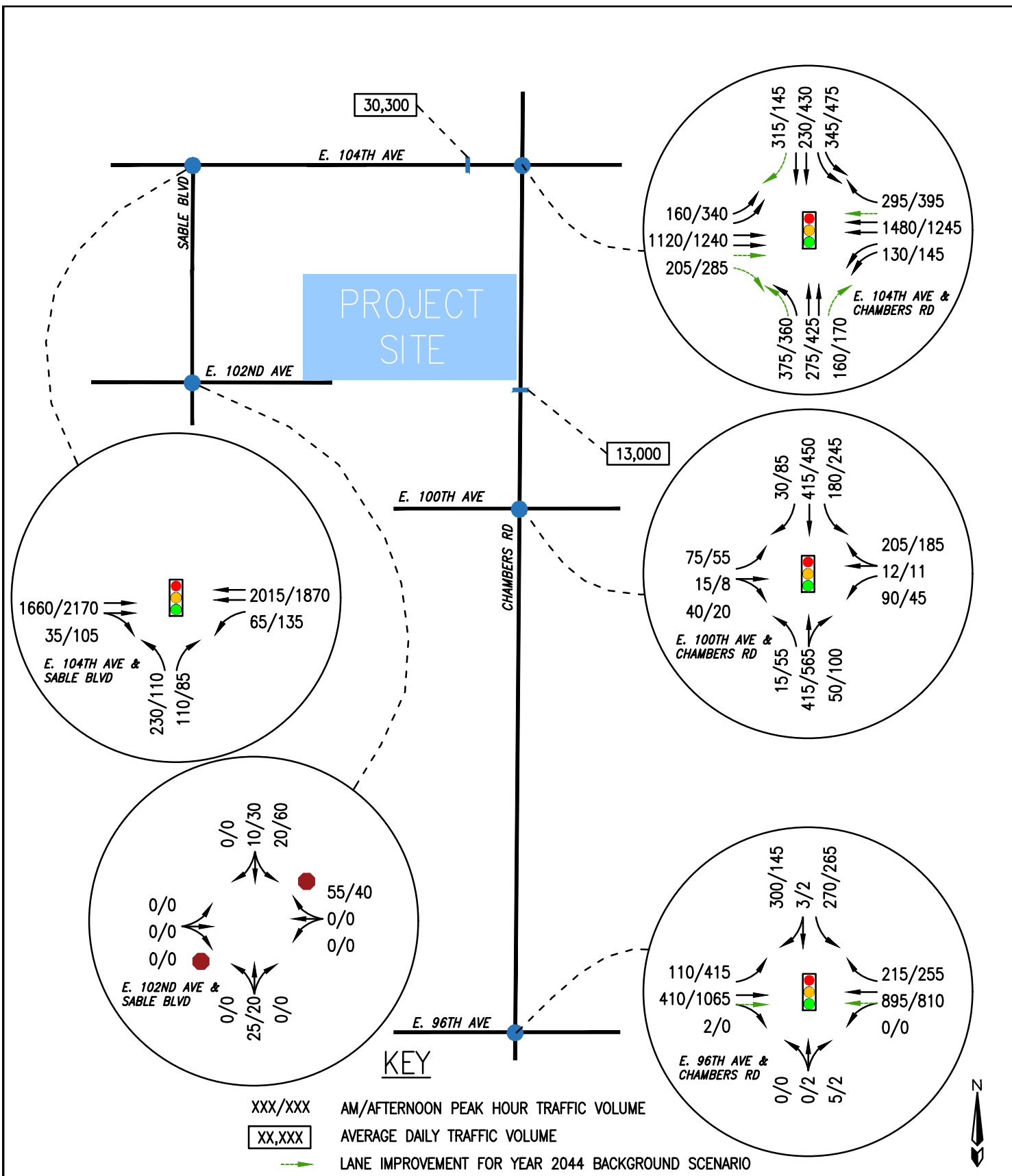


Table 1 – Existing and Future Background Intersection LOS and Queue Summary

Int.	Lane	Storage	Existing						Year 2027 Background						Year 2044 Background					
			AM Peak			PM Peak			AM Peak			PM Peak			AM Peak			PM Peak		
			Delay (s)	LOS	Q ⁽¹⁾	Delay (s)	LOS	Q ⁽¹⁾	Delay (s)	LOS	Q ⁽¹⁾	Delay (s)	LOS	Q ⁽¹⁾	Delay (s)	LOS	Q ⁽¹⁾	Delay (s)	LOS	Q ⁽¹⁾
Chambers Rd & 104th Ave	Overall	-	38	D	-	47	D	-	48	D	-	41	D	-	35	C	-	38	D	-
	EB LT	275'	61	E	72'	66	E	152'	60	E	85'	62	E	155'	58	E	81'	64	E	226'
	EB TH+RT	-	27	C	357'	49	D	742'	42	D	515'	34	C	467'	20	C	251'	26	C	302'
	EB RT	-													18	B	31'	24	C	53'
	WB LT	380'	61	E	55'	55	D	78'	61	E	66'	60	E	77'	61	E	89'	62	E	97'
	WB TH	-	30	C	430'	39	D	550'	52	D	629'	34	C	506'	24	C	456'	33	C	430'
	WB RT	350'	0	A	34'	0	A	27'	0	A	43'	0	A	27'	0	A	55'	0	A	77'
	NB LT	290'	71	E	268'	47	D	289'	69	E	252'	46	D	263'	40	D	170'	37	D	135'
	NB TH+RT	-	44	D	125'	48	D	217'	37	D	129'	48	D	207'	48	D	157'	53	D	226'
	NB RT	-													59	E	61'	52	D	63'
	SB LT	285'	38	D	107'	36	D	131'	31	C	99'	37	D	127'	40	D	160'	40	D	181'
	SB TH+RT	-	61	E	112'	57	E	217'	50	D	108'	56	E	208'	46	D	136'	48	D	225'
	SB RT	-													79	E	271'	31	C	64'
Chambers Rd & 96th Ave	Overall		21	C	-	44	D	-	25	C	-	36	D	-	24	C	-	35	C	-
	EB LT	70'	30	C	64'	29	C	203'	33	C	69'	29	C	193'	32	C	101'	64	E	433'
	EB TH+RT	-	7	A	133'	11	B	579'	7	A	147'	10	A	473'	9	A	93'	9	A	258'
	WB LT+TH	-	25	C	565'	110	F	673'	32	C	637'	82	F	638'	28	C	406'	54	D	392'
	WB RT	-	12	B	37'	16	B	47'	12	B	43'	15	B	46'	18	B	52'	25	C	57'
	NB LT+TH+RT	-	51	D	0'	59	E	6'	52	D	0'	58	E	6'	48	D	0'	53	D	8'
	SB LT	85'	28	C	142'	29	C	160'	29	C	155'	29	C	153'	25	C	249'	40	D	260'
	SB TH+RT	-	29	C	39'	24	C	33'	30	C	40'	24	C	32'	34	C	64'	28	C	49'
Chambers Rd & 100th Ave	Overall		5	A	-	5	A	-	9	A	-	10	B	-	19	B	-	12	B	-
	EB LT	150'							62	F	73'	>120	F	90'	56	E	162'	20	B	33'
	EB LT+TH+RT	-	17	C	8'	24	C	8'	14	B	8'	17	C	5'	38	D	46'	14	B	15'
	WB LT	100'	25	D	25'	34	D	20'	36	E	40'	62	F	38'	42	D	118'	15	B	27'
	WB TH+RT	-	12	B	23'	14	B	25'	13	B	28'	16	C	35'	45	D	77'	18	B	50'
	NB LT	235'													10	A	10'	8	A	22'
	NB LT+TH+RT	-	8	A	0'	8	A	0'	8	A	0'	8	A	3'	8	A	190'	9	A	307'
	SB LT	235'													15	B	201'	26	C	178'
	SB LT+TH+RT	-	8	A	8'	9	A	13'	8	A	10'	9	A	15'	8	A	394'	7	A	137'
	SB RT	135'													6	A	25'	4	A	15'
Sable Blvd & 104th Ave	Overall		29	C	-	12	B	-	11	B	-	8	A	-	13	B	-	11	B	-
	EB TH+RT	-	0	A	0'	0	A	0'	7	A	311'	7	A	408'	9	A	308'	12	B	686'
	WB LT	300'	12	B	5'	16	B	18'	11	B	9'	19	C	57'	19	C	37'	31	D	73'
	WB TH	-	0	A	0'	0	A	0'	7	A	123'	4	A	78'	9	A	220'	5	A	565'
	NB LT	125'	>120	F	285'	>120	F	140'	59	F	214'	62	F	128'	62	F	263'	62	F	147'
	NB RT	-	14	B	13'	17	B	13'	49	E	53'	58	F	69'	47	E	116'	59	F	47'
Sable Blvd & 102nd Ave	Overall								6	A	-	5	A	-	6	A	-	5	A	-
	EB LT+TH+RT	-							0	A	0'	0	A	0'	0	A	0'	0	A	0'
	WB LT+TH+RT	-							9	A	5'	9	A	3'	9	A	5'	9	A	3'
	NB LT+TH+RT	-							0	A	0'	0	A	0'	0	A	0'	0	A	0'
	SB LT+TH+RT	-							7	A	0'	7	A	3'	7	A	0'	7	A	3'

(1) 95th-percentile queue length as calculated by Synchro/HCM

Note: Delay represented in average seconds per vehicle.

5.0 PROPOSED DEVELOPMENT TRAFFIC

5.1 Trip Generation

In order to estimate the anticipated volume of trips generated by the site at buildout, trip rates contained in the Institute of Transportation Engineers (ITE) Trip Generation manual² for the ITE #220 “Multifamily Housing (Low-Rise)” land use category were applied, consistent with the requirements of Section 5.02.1.D. of the City of Commerce City Engineering Construction Standards and Specifications.

The resulting existing trip estimates using ITE rates are provided on **Table 2**, below.

Table 2 – Trip Generation Estimates

Land Use	Size	Unit	Average Daily Trips				AM Peak Hour Trips				PM Peak Hour Trips			
			Rate	Total	In	Out	Rate	Total	In	Out	Rate	Total	In	Out
ITE #220 - Multifamily Housing (Low-Rise)	283	Dwelling Units	6.74	1907	954	953	0.40	113	27	86	0.51	144	91	53
Total Added Trips				1907	954	953		113	27	86		144	91	53

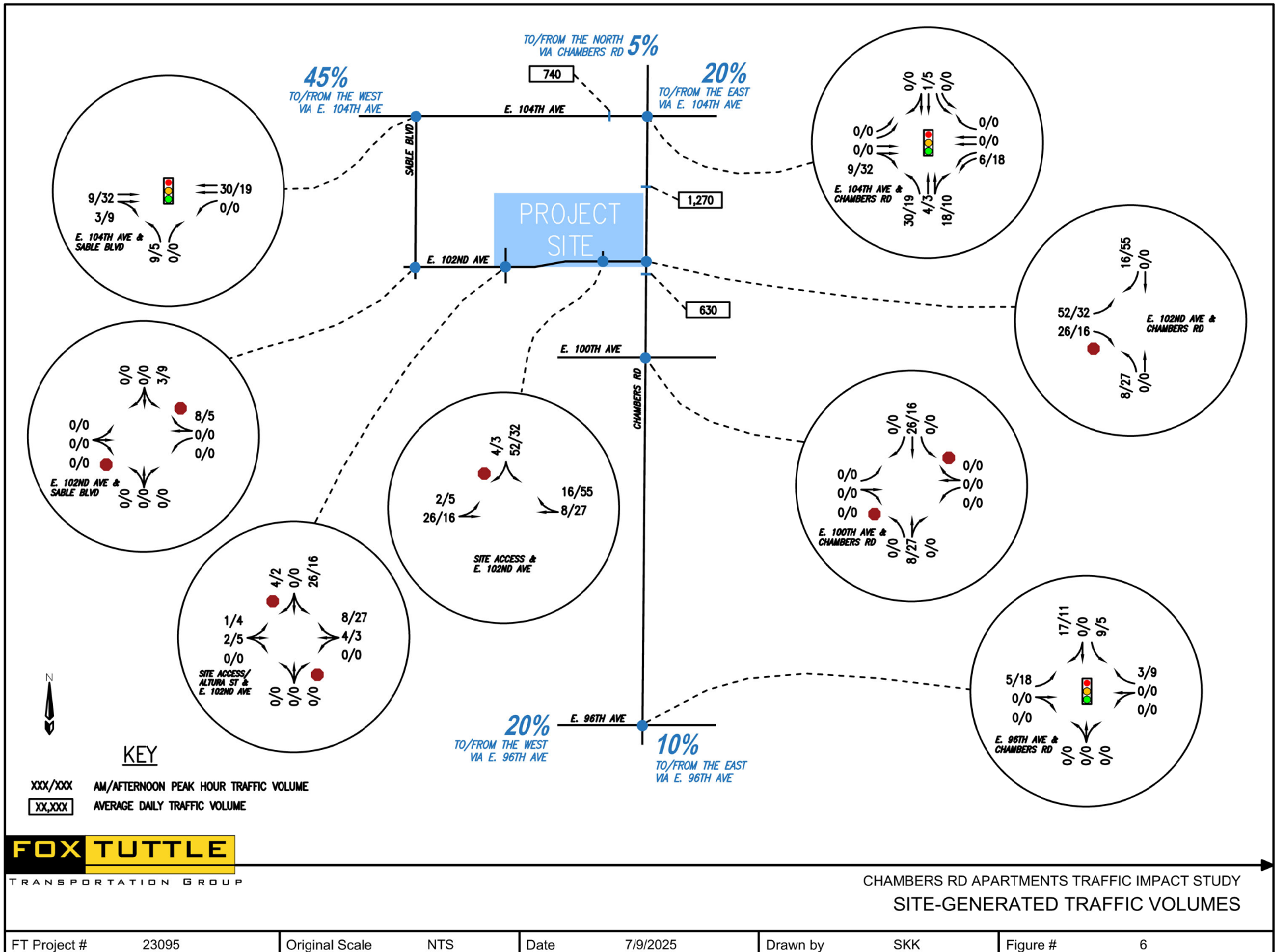
Source: ITE Trip Generation 11th Edition. 2021.

As show above, using ITE rates the project site is anticipated to generate approximately 1,907 daily, 113 AM peak hour and 144 PM peak hour trips at full buildout and occupancy.

5.2 Trip Distribution and Assignment

The site-generated traffic volumes presented in **Table 2** were distributed onto the adjacent street network based on existing traffic data, existing and anticipated future traffic patterns in and around the area, and consideration of local and regional origins and destinations for the proposed residential use. The assumed distribution percentages are shown on **Figure 6**, along with the resulting site-generated traffic volume estimates with buildout of the project.

² Trip Generation 11th Edition, Institute of Transportation Engineers, 2021.



6.0 FUTURE TRAFFIC CONDITIONS WITH SITE DEVELOPMENT

This analysis has been conducted in order to determine impacts associated with full development and occupancy of the project in the short-term and long-term scenarios.

With the connectivity of E. 102nd Avenue to Chambers Road, it is anticipated that some existing traffic from the western portion of the Harvest Meadows neighborhood to the south, as well as a small portion of future trips from the Anderson Ranch development to the west (on the order of a total of 5-10 trips per peak hour based on the number of residences these routes would serve), may shift to this connection as it will provide more direct access to Chambers Road and the E. 104th Avenue corridor. The future-year projections analyzed for the 2027 and 2044 scenarios with the project development in place assume this shift.

6.1 Intersection Capacity Analysis for Year 2027 w/Project Scenario

The site-generated traffic volumes were added to the Year 2027 background traffic volumes to analyze potential site impacts in the short-term buildout scenario, representing full buildout of the site. The Year 2027 total (with project) traffic volumes are illustrated on **Figure 7**. The level of service criteria discussed in prior sections was applied to the study area intersections to determine impacts with the addition of site-build out traffic volumes in the short-term planning horizon. The results of the LOS and queue calculations for the intersections are summarized for each scenario on **Table 3**. The intersection level of service and queue worksheets are attached in the Appendix.

As shown in **Table 3**, the study area intersections and proposed accesses are projected to operate acceptably (LOS D or better overall) with the addition of site traffic at full project buildout in the short-term.

The E. 102nd Avenue & Chambers Road intersection is anticipated to operate acceptably overall as a side-street stop-controlled intersection, with left-turn deceleration and right-turn deceleration lanes in place, consistent with City of Commerce City Engineering Construction Standards and Specifications requirements (discussed further in Section 6.3).

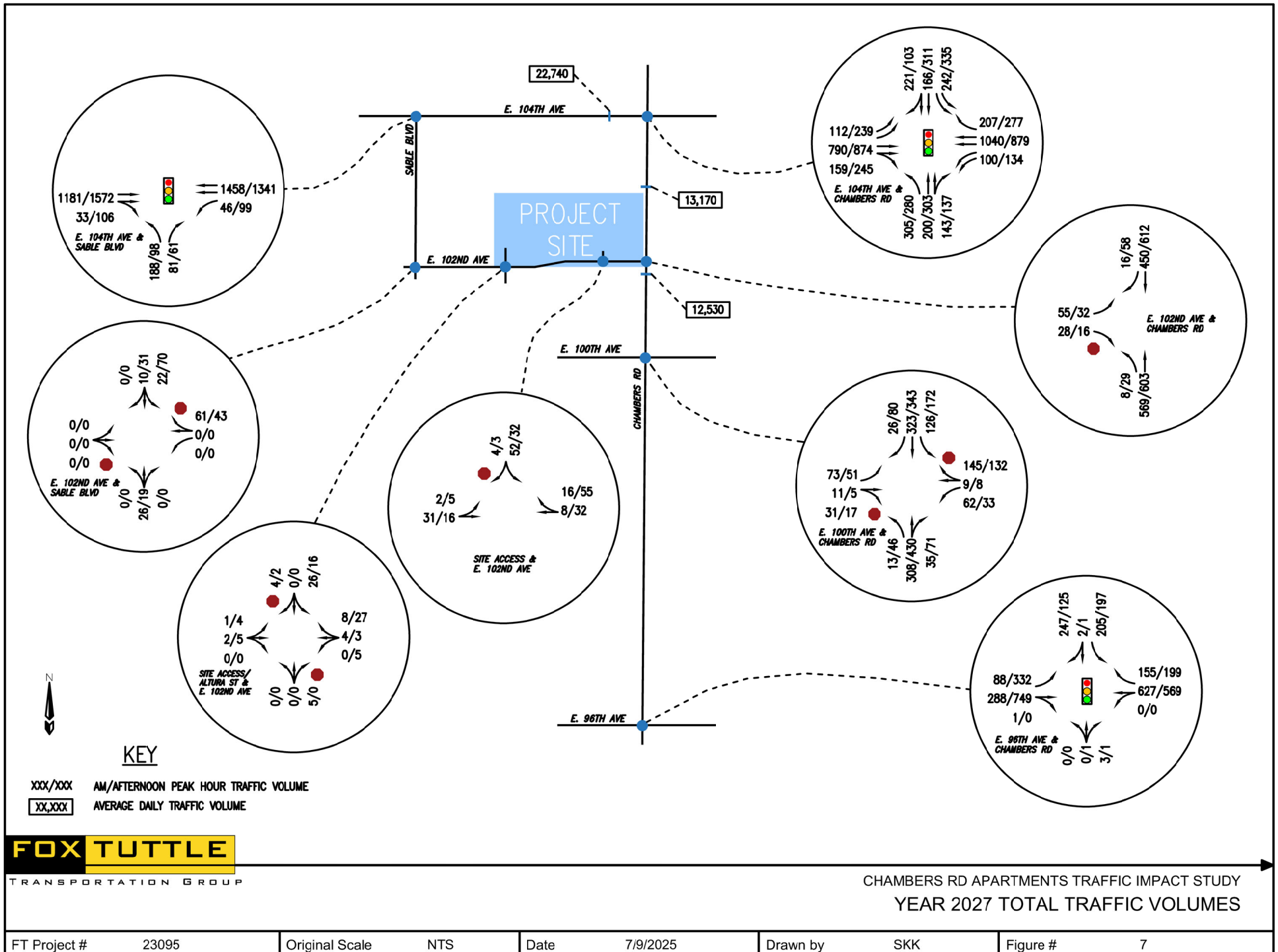
6.2 Intersection Capacity Analysis for Year 2044 w/Project Scenario

The site-generated traffic volumes were added to the Year 2044 background traffic volumes to analyze potential site impacts in the long-term buildout scenario. The Year 2044 total (with project) traffic volumes are illustrated on **Figure 8**. The level of service criteria discussed in prior sections was applied to the study area intersections to determine impacts with the addition of site-build out traffic volumes in the long-term planning horizon. The results of the LOS and

queue calculations for the intersections are summarized for each scenario on **Table 3**. The intersection level of service and queue worksheets are attached in the Appendix. Long-term background improvements, including the widening of E. 104th Avenue to six-lanes and E. 96th Avenue to four-lanes, to meet 20-year background growth projections, were assumed in place for this scenario.

As shown in **Table 3**, the study area intersections and proposed accesses are projected to operate acceptably overall (LOS D or better) with the addition of site traffic with full project buildout in the long-term. The E. 102nd Avenue & Chambers Road intersection is anticipated to continue to operate acceptably overall as a side-street stop-controlled intersection, with left-turn deceleration and right-turn deceleration lanes in place, consistent with City of Commerce City Engineering Construction Standards and Specifications requirements (discussed further in Section 6.3).

Although the intersection is anticipated to operate at acceptable overall LOS, the individual eastbound left-turn movement at E. 102nd Avenue & Chambers Road is anticipated to operate at LOS F in the AM and PM peak hour for 20-year buildout conditions. The projected 95th-percentile queues during these periods is calculated to be up to 3 vehicles, indicating minimal operational impact with the addition of project traffic. This LOS is common of a side-street stop-controlled approach to an arterial roadway and does not in itself warrant mitigation. However, traffic signal warrants were reviewed to determine if this intersection would approach signal warrant thresholds in the Year 2044 buildout scenario. As discussed in Section 6.4, this intersection is not anticipated to meet signal warrants and can operate effectively with side-street stop control.



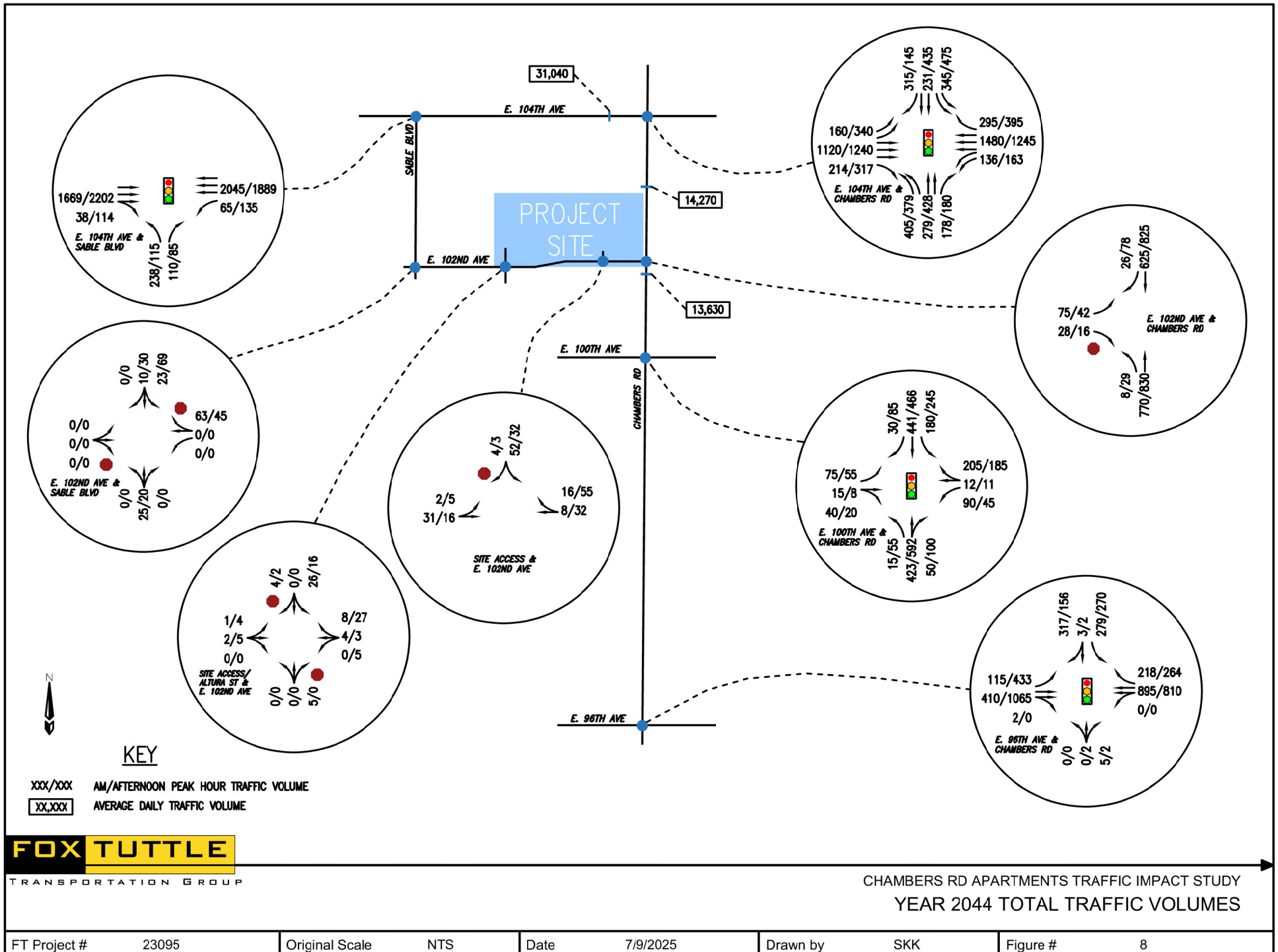


Table 3 – Future Intersection LOS and Queue Summary w/Project

Int.	Lane	Storage	Year 2027 w/Project						Year 2044 w/Project					
			AM Peak			PM Peak			AM Peak			PM Peak		
			Delay (s)	LOS	Q ⁽¹⁾	Delay (s)	LOS	Q ⁽¹⁾	Delay (s)	LOS	Q ⁽¹⁾	Delay (s)	LOS	Q ⁽¹⁾
Chambers Rd & 104th Ave	Overall	-	45	D	-	40	D	-	34	C	-	32	C	-
	EB LT	275'	98	F	86'	61	E	173'	59	E	113'	54	D	199'
	EB TH+RT	-	11	B	469'	17	B	351'	6	A	166'	5	A	286'
	EB RT	-							6	A	19'	5	A	117'
	WB LT	380'	69	E	71'	78	E	93'	63	E	92'	62	E	106'
	WB TH	-	34	C	520'	39	D	400'	32	C	536'	33	C	417'
	WB RT	350'	0	A	38'	0	A	23'	0	A	61'	0	A	93'
	NB LT	290'	>120	F	429'	46	D	329'	37	D	176'	37	D	157'
	NB TH+RT	-	41	D	122'	43	D	213'	45	D	153'	53	D	234'
	NB RT	-							49	D	79'	55	E	69'
	SB LT	285'	39	D	105'	41	D	140'	41	D	141'	42	D	189'
	SB TH+RT	-	63	E	171'	74	E	232'	47	D	139'	49	D	239'
	SB RT	-							94	F	223'	32	C	67'
Chambers Rd & 96th Ave	Overall		35	D	-	49	D	-	26	C	-	37	D	-
	EB LT	70'	39	D	93'	38	D	323'	33	C	105'	76	E	457'
	EB TH+RT	-	9	A	145'	11	B	473'	10	A	93'	9	A	258'
	WB LT+TH	-	50	D	665'	>120	F	638'	30	C	408'	55	E	392'
	WB RT	-	15	B	47'	19	B	51'	18	B	51'	26	C	58'
	NB LT+TH+RT	-	57	E	0'	62	E	6'	48	D	0'	53	D	8'
	SB LT	85'	30	C	191'	31	C	173'	25	C	262'	41	D	267'
	SB TH+RT	-	46	D	44'	27	C	42'	37	D	66'	28	C	50'
Chambers Rd & 100th Ave	Overall		10	A	-	12	B	-	19	B	-	19	B	-
	EB LT	150'	70	E	80'	>120	F	100'	56	E	161'	87	F	130'
	EB TH+RT	-	14	B	10'	18	B	5'	38	D	46'	44	D	35'
	WB LT	100'	39	D	43'	69	E	40'	43	D	116'	47	D	73'
	WB TH+RT	-	13	B	28'	17	B	38'	46	D	76'	81	F	80'
	NB LT	235'	8	A	0'	8	A	3'	10	A	10'	6	A	20'
	NB TH+RT	-	0	A	0'	0	A	0'	8	A	203'	6	A	251'
	SB LT	235'	8	A	10'	9	A	18'	15	B	57'	18	B	125'
	SB TH	-	0	A	0'	0	A	0'	8	A	116'	5	A	73'
Sable Blvd & 104th Ave	Overall		17	B	-	7	A	-	13	B	-	15	B	-
	EB TH+RT	-	7	A	322'	7	A	442'	9	A	332'	13	B	715'
	WB LT	300'	21	C	14'	11	B	97'	20	B	84'	33	C	82'
	WB TH	-	18	B	510'	0	A	564'	9	A	681'	14	B	478'
	NB LT	125'	59	E	221'	62	E	134'	57	E	267'	61	E	151'
	NB RT	-	49	D	54'	57	E	70'	46	D	118'	58	E	47'
Sable Blvd & 102nd Ave	Overall		5	A	-	5	A	-	6	A	-	6	A	-
	EB LT+TH+RT	-	0	A	0'	0	A	0'	0	A	0'	0	A	0'
	WB LT+TH+RT	-	9	A	5'	9	A	3'	9	A	5'	9	A	3'
	NB LT+TH+RT	-	0	A	0'	0	A	0'	0	A	0'	0	A	0'
	SB LT+TH+RT	-	7	A	0'	7	A	5'	7	A	0'	7	A	3'
Chambers Road & 102nd Ave	Overall		2	A	-	1	A	-	3	A	-	2	A	-
	EB LT	-	27	D	25'	35	E	20'	53	F	68'	68	F	48'
	EB RT	50'	12	B	5'	13	B	3'	13	B	5'	15	B	3'
	NB LT	175'	8	A	0'	9	A	3'	9	A	0'	10	A	3'
	NB TH	-	0	A	0'	0	A	0'	0	A	0'	0	A	0'
	SB TH	-	0	A	0'	0	A	0'	0	A	0'	0	A	0'
	SB TH+RT	135'	0	A	0'	0	A	0'	0	A	0'	0	A	0'
E. Access & 102nd	Overall		5	A	-	3	A	-	4	A	-	2	A	-
	EB LT+TH	-	7	A	0'	7	A	0'	7	A	0'	7	A	0'
	WB TH+RT	-	0	A	0'	0	A	0'	0	A	0'	0	A	0'
	SB LT+RT	-	9	A	5'	9	A	3'	9	A	5'	9	A	3'
W. Access/Altura & 102nd	Overall		6	A	-	4	A	-	6	A	-	4	A	-
	EB LT+TH+RT	-	7	A	0'	7	A	0'	7	A	0'	7	A	0'
	WB LT+TH+RT	-	0	A	0'	7	A	0'	7	A	0'	7	A	0'
	NB LT+TH+RT	-	8	A	0'	0	A	0'	9	A	0'	9	A	0'
	SB LT+TH+RT	-	9	A	3'	9	A	3'	9	A	3'	9	A	3'

(1) 95th-percentile queue length as calculated by Synchro/HCM

Note: Delay represented in average seconds per vehicle.

6.3 Site Access and Circulation

The project proposes the following access points and configurations:

- Full-movement access along E. 102nd Avenue approximately 370' west of Chambers Road
- Full-movement access aligning with Altura Street approximately 1,200' west of Chambers Road

The project proposes to extend E. 102nd Avenue from Chambers to the west along the project frontage consistent with the City's "Minor/Residential Collector" standards per the C3 Vision Transportation Plan Roadway Classification Plan. This includes construction of the E. 102nd Avenue & Chambers Road intersection as a full-movement, side-street stop-controlled intersection, which will provide access to the project via Chambers Road. Per the concept site plan, a detached sidewalk is proposed along the north side of E. 102nd Avenue along the project frontage. Internal drive aisles and interior parking throughout the site allows direct access to each of the proposed buildings and access to on-site amenities without traveling on exterior roadways.

As noted in Section 6.0, with the connectivity of E. 102nd Avenue to Chambers Road, it is anticipated that some existing traffic from the western portion of the Harvest Meadows neighborhood to the south, as well as future trips from the Anderson Ranch development to the west (on the order of 5-10 vehicles per peak hour), may shift to this connection as it will provide more direct access to Chambers Road and the E. 104th Avenue corridor. This will result in a change in traffic patterns within the adjacent Harvest Meadows neighborhood, with a likely reduced use of E. 101st Avenue for access to/from the western portion of Harvest Meadows to access the E. 104th Avenue corridor, in favor of increased use of E. 102nd Avenue.

Based on the projected site trips at buildout and accounting for this shift of some existing/future traffic to the E. 102nd Avenue & Chambers Road intersection, the following auxiliary lanes are prescribed per Section 3.04 of the City of Commerce City Engineering Construction Standards and Specifications:

- Construct a northbound left-turn deceleration lane = 175' lane + 180' (15:1) taper; this includes a 40' storage component as required by City standards
- Construct a southbound right-turn deceleration lane = 135' + 180' (15:1) taper

6.4 Traffic Signal Warrants

An analysis of a potential traffic signal at the E. 102nd Avenue & Chambers Road intersection was performed consistent with Manual on Uniform Traffic Control Devices (MUTCD) criteria.

The MUTCD provides criteria for nine different warrants. For the purposes of this planning-level analysis, MUTCD “Peak Hour”, warrant criteria was applied and used as an indicator to determine applicability of a signal at this location with 20-year buildout traffic volumes. These warrants consider the hourly volume of both the “major street” (Chambers Road) and the “minor street” approaches (E. 102nd Avenue eastbound approach).

The MUTCD Peak Hour signal warrant analysis graph with plots of the projected Year 2044 AM and PM peak hour volume totals is provided in the Appendix. Consistent with MUTCD criteria, eastbound right-turns from E. 102nd Avenue were not included since the LOS and queue analysis shows that these turns can be made onto Chambers Road with minimal conflict. Thus, only the left-turn volumes were applied, and the approach was evaluated as a one-lane approach on the warrant chart.

Based on the projected traffic volumes and MUTCD Peak Hour criteria, this intersection is not anticipated to meet any signal warrant thresholds in the 20-year buildout scenario.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This traffic impact study has been prepared by the Fox Tuttle Transportation Group for the Chambers Road Apartments project in the City of Commerce City. The project proposes to develop multifamily rental residential units at the northwest quadrant of the E. 102nd Avenue and Chambers Road intersection.

The project proposes 283 apartments with access via one full-movement intersection and one right-turn out only intersection along E. 102nd Avenue. The project is anticipated to generate approximately 1,907 daily, 113 AM peak hour and 144 PM peak hour driveway trips at full buildout and occupancy. **It was determined that the existing and future roadway and intersection network can serve the project at acceptable Levels of Service per City criteria in the short and long-term with the following background (non-project related) and project-related improvements in place:**

Long-Term (Year 2044) Background (non-project related) Improvement Recommendations:

- If future regional growth projections are realized, the intersection of E. 104th Avenue & Chambers Road will need to be constructed to its buildout lane geometry, with three (3) through lanes in each direction eastbound and westbound on E. 104th Avenue and exclusive right-turn lanes added on the eastbound, northbound and southbound approaches.

- If future regional growth projections are realized, the intersection of E. 96th Avenue & Chambers Road will need to be constructed to its buildout lane geometry, with two (2) through lanes in each direction eastbound and westbound on E. 96th Avenue.
- Roadway improvements identified by the adjacent Anderson Ranch project were assumed to be implemented in the background for this study. Those improvements include:
 - Install traffic signal control at E. 104th Avenue and Sable Boulevard. Extend northbound left turn storage at the intersection to 125 feet.
 - Add eastbound, northbound, and southbound left turn auxiliary lanes and southbound right turn auxiliary lane at E. 100th Avenue and Chambers Road. Install traffic signal control at the intersection.
 - Extend eastbound left turn storage at E. 96th Avenue & Chambers Road to 450 feet. Extend southbound right turn storage at E. 96th Avenue & Chambers Road to 275 feet.

Project-Related Improvement Recommendations (Responsibility of the Developer):

- Extend E. 102nd Avenue from Chambers Road to the west along the project frontage. This roadway should be built consistent with the City's "Minor/Residential Collector" standards per the C3 Vision Transportation Plan Roadway Classification Plan.
- The intersection of E. 102nd Avenue and Chambers Road should be built as a side-street, stop-controlled intersection to include a northbound left-turn deceleration lane (175' lane + 180' taper) and a southbound right-turn deceleration lane (135' + 180'), consistent with the City of Commerce City Engineering Construction Standards and Specifications. The eastbound approach should be striped with a 75' left turn lane.
- Construct the east access to the site along E. 102nd Avenue with side-street stop-sign control on the southbound approach. No auxiliary turn lanes are required or recommended at this access given the Minor Collector roadway classification, consistent with City standards.
- Construct the west access to the site along E. 102nd Avenue to align with Altura Street, with side-street stop-sign control on the northbound and southbound approaches. No auxiliary turn lanes are required or recommended at this access given the Minor Collector roadway classification, consistent with City standards.

APPENDIX

Level of Service Definitions
Intersection Capacity Worksheets
MUTCD Peak Hour Signal Warrant
Traffic Count Data Sheets



Level of Service Definitions



LEVEL OF SERVICE (LOS) DEFINITIONS

In rating roadway and intersection operating conditions with existing or future traffic volumes, “Levels of Service” (LOS) A through F are used, with LOS A indicating very good operation and LOS F indicating poor operation. Levels of service at signalized and unsignalized intersections are closely associated with vehicle delays experienced in seconds per vehicle. More complete level of service definitions and delay data for signal and stop sign controlled intersections are contained in the following table for reference.

Level of Service Rating	Delay in seconds per vehicle*		Definition
	Signalized	Unsignalized	
A	0.0 to 10.0	0.0 to 10.0	Low vehicular traffic volumes; primarily free flow operations. Density is low and vehicles can freely maneuver within the traffic stream. Drivers can maintain their desired speeds with little or no delay.
B	10.1 to 20.0	10.1 to 15.0	Stable vehicular traffic volume flow with potential for some restriction of operating speeds due to traffic conditions. Vehicle maneuvering is only slightly restricted. The stopped delays are not bothersome, and drivers are not subject to appreciable tension.
C	20.1 to 35.0	15.1 to 25.0	Stable traffic operations, however, the ability for vehicles to maneuver is more restricted by the increase in traffic volumes. Relatively satisfactory operating speeds prevail, but adverse signal coordination or longer vehicle queues cause delays along the corridor.
D	35.1 to 55.0	25.1 to 35.0	Approaching unstable vehicular traffic flow where small increases in volume could cause substantial delays. Most drivers are restricted in ability to maneuver and selection of travel speeds due to congestion. Driver comfort and convenience are low, but tolerable.
E	55.1 to 80.0	35.1 to 50.0	Traffic operations characterized by significant approach delays and average travel speeds of one-half to one-third the free flow speed. Vehicular flow is unstable and there is potential for stoppages of brief duration. High signal density, extensive vehicle queuing, or corridor signal progression/timing are the typical causes of vehicle delays at signalized corridors.
F	> 80.0	> 50.0	Forced vehicular traffic flow and operations with high approach delays at critical intersections. Vehicle speeds are reduced substantially and stoppages may occur for short or long periods of time because of downstream congestion.

* Delay ranges based on 2010 Highway Capacity Manual Criteria

Intersection Capacity Worksheets



Timings

1: Chambers Rd & E. 104th Ave

Existing AM

Chambers Rd Apartments Traffic Impact Study

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	 	 	 	 			 	 	 
Traffic Volume (vph)	103	715	74	952	190	216	168	223	147
Future Volume (vph)	103	715	74	952	190	216	168	223	147
Turn Type	Prot	NA	Prot	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6		7	4	3	8
Permitted Phases					6	4		8	
Detector Phase	5	2	1	6	6	7	4	3	8
Switch Phase									
Minimum Initial (s)	3.0	15.0	3.0	15.0	15.0	3.0	5.0	3.0	5.0
Minimum Split (s)	12.0	37.0	12.0	37.0	37.0	11.7	34.7	11.7	34.7
Total Split (s)	22.0	44.0	22.0	44.0	44.0	19.0	35.0	19.0	35.0
Total Split (%)	18.3%	36.7%	18.3%	36.7%	36.7%	15.8%	29.2%	15.8%	29.2%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	4.7	4.7	4.7	4.7
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)	7.0	7.0	7.0	7.0	7.0	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effect Green (s)	9.6	59.2	8.6	58.2	58.2	25.6	13.3	24.0	12.5
Actuated g/C Ratio	0.08	0.49	0.07	0.49	0.49	0.21	0.11	0.20	0.10
v/c Ratio	0.44	0.57	0.37	0.69	0.27	1.01	0.66	0.48	0.72
Control Delay (s/veh)	57.5	23.7	57.2	27.7	3.5	99.9	47.2	37.9	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	57.5	23.7	57.2	27.7	3.5	99.9	47.2	37.9	29.0
LOS	E	C	E	C	A	F	D	D	C
Approach Delay (s/veh)		27.4		25.7			71.8		32.5
Approach LOS		C		C			E		C

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 8 (7%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay (s/veh): 33.9

Intersection LOS: C

Intersection Capacity Utilization 75.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Chambers Rd & E. 104th Ave

 Ø1 22 s	 Ø2 (R) 44 s	 Ø3 19 s	 Ø4 35 s
 Ø5 22 s	 Ø6 (R) 44 s	 Ø7 19 s	 Ø8 35 s

Queues

Existing AM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	117	955	89	1147	229	245	280	245	385
v/c Ratio	0.44	0.57	0.37	0.69	0.27	1.01	0.66	0.48	0.72
Control Delay (s/veh)	57.5	23.7	57.2	27.7	3.5	99.9	47.2	37.9	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	57.5	23.7	57.2	27.7	3.5	99.9	47.2	37.9	29.0
Queue Length 50th (ft)	45	266	34	356	0	~163	86	77	62
Queue Length 95th (ft)	72	357	55	430	34	#268	125	107	112
Internal Link Dist (ft)		3830		955			548		948
Turn Bay Length (ft)	275		380		350	290		285	
Base Capacity (vph)	416	1667	416	1667	863	243	840	534	932
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	0.28	0.57	0.21	0.69	0.27	1.01	0.33	0.46	0.41

Intersection Summary

~ 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.

HCM 7th Signalized Intersection Summary

Existing AM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	103	715	125	74	952	190	216	168	78	223	147	203
Future Volume (veh/h)	103	715	125	74	952	190	216	168	78	223	147	203
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	117	812	142	89	1147	0	245	191	89	245	162	223
Peak Hour Factor	0.88	0.88	0.88	0.83	0.83	0.83	0.88	0.88	0.88	0.91	0.91	0.91
Percent Heavy Veh, %	5	5	5	5	5	5	2	2	2	2	2	2
Cap, veh/h	173	1363	238	140	1568		272	458	205	637	295	263
Arrive On Green	0.05	0.46	0.46	0.04	0.45	0.00	0.10	0.19	0.19	0.08	0.17	0.17
Sat Flow, veh/h	3374	2951	516	3374	3469	1547	1781	2386	1069	3456	1777	1585
Grp Volume(v), veh/h	117	477	477	89	1147	0	245	140	140	245	162	223
Grp Sat Flow(s),veh/h/ln	1687	1735	1733	1687	1735	1547	1781	1777	1678	1728	1777	1585
Q Serve(g_s), s	4.1	24.5	24.5	3.1	32.5	0.0	12.3	8.3	8.8	6.9	10.0	16.4
Cycle Q Clear(g_c), s	4.1	24.5	24.5	3.1	32.5	0.0	12.3	8.3	8.8	6.9	10.0	16.4
Prop In Lane	1.00		0.30	1.00		1.00	1.00		0.64	1.00		1.00
Lane Grp Cap(c), veh/h	173	801	800	140	1568		272	341	322	637	295	263
V/C Ratio(X)	0.68	0.60	0.60	0.64	0.73		0.90	0.41	0.43	0.38	0.55	0.85
Avail Cap(c_a), veh/h	422	801	800	422	1568		272	419	396	727	419	374
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.9	24.0	24.0	56.6	26.9	0.0	40.4	42.5	42.7	37.2	45.9	48.6
Incr Delay (d2), s/veh	4.6	3.3	3.3	4.7	3.1	0.0	30.3	0.8	0.9	0.4	1.6	11.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	10.2	10.2	1.4	13.2	0.0	8.2	3.7	3.7	2.9	4.5	7.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	60.5	27.2	27.2	61.3	30.0	0.0	70.6	43.3	43.7	37.6	47.5	60.5
LnGrp LOS	E	C	C	E	C		E	D	D	D	D	E
Approach Vol, veh/h	1071			1236			525			630		
Approach Delay, s/veh	30.9			32.2			56.2			48.2		
Approach LOS	C			C			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	62.4	15.9	29.7	13.2	61.2	19.0	26.6				
Change Period (Y+Rc), s	7.0	7.0	6.7	6.7	7.0	7.0	6.7	6.7				
Max Green Setting (Gmax), s	15.0	37.0	12.3	28.3	15.0	37.0	12.3	28.3				
Max Q Clear Time (g_c+I1), s	5.1	26.5	8.9	10.8	6.1	34.5	14.3	18.4				
Green Ext Time (p_c), s	0.1	4.1	0.3	1.3	0.2	1.7	0.0	1.5				

Intersection Summary

HCM 7th Control Delay, s/veh 38.4

HCM 7th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings 2: Chambers Rd & 96th Ave

Existing AM
Chambers Rd Apartments Traffic Impact Study

							
Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	54	265	577	131	0	157	2
Future Volume (vph)	54	265	577	131	0	157	2
Turn Type	Prot	NA	NA	Perm	NA	Split	NA
Protected Phases	5	2	6		8	4	4
Permitted Phases				6			
Detector Phase	5	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	59.0	36.0	36.0	23.0	23.0	23.0
Total Split (%)	21.9%	56.2%	34.3%	34.3%	21.9%	21.9%	21.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	Min	None	None	None	None	None
Act Effect Green (s)	8.3	40.7	32.9	32.9	5.7	12.7	12.7
Actuated g/C Ratio	0.13	0.62	0.50	0.50	0.09	0.19	0.19
v/c Ratio	0.31	0.35	0.75	0.18	0.02	0.58	0.41
Control Delay (s/veh)	33.5	8.4	24.8	4.4	0.0	33.2	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	33.5	8.4	24.8	4.4	0.0	33.2	7.9
LOS	C	A	C	A	A	C	A
Approach Delay (s/veh)		12.7	21.0				20.8
Approach LOS		B	C				C

Intersection Summary

Cycle Length: 105

Actuated Cycle Length: 65.4

Natural Cycle: 115

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.75

Intersection Signal Delay (s/veh): 18.8

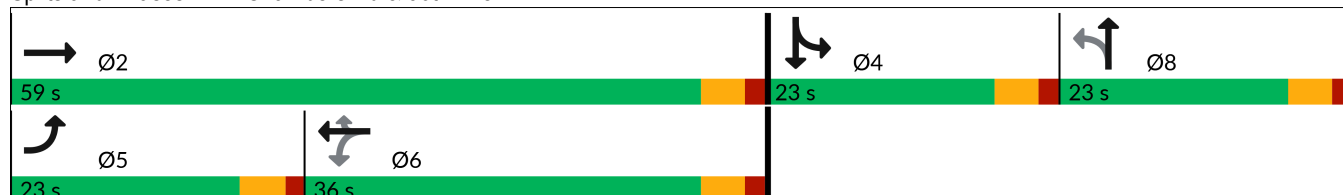
Intersection LOS: B

Intersection Capacity Utilization 68.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: Chambers Rd & 96th Ave



Queues

Existing AM

2: Chambers Rd & 96th Ave

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	66	324	671	152	8	194	188
v/c Ratio	0.31	0.35	0.75	0.18	0.02	0.58	0.41
Control Delay (s/veh)	33.5	8.4	24.8	4.4	0.0	33.2	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	33.5	8.4	24.8	4.4	0.0	33.2	7.9
Queue Length 50th (ft)	25	48	223	2	0	73	1
Queue Length 95th (ft)	64	133	#565	37	0	142	39
Internal Link Dist (ft)		1966	2271		176		2115
Turn Bay Length (ft)	125			300			
Base Capacity (vph)	486	1249	894	845	771	496	586
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.26	0.75	0.18	0.01	0.39	0.32

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

2: Chambers Rd & 96th Ave

Existing AM

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	265	1	0	577	131	0	0	3	157	2	151
Future Volume (veh/h)	54	265	1	0	577	131	0	0	3	157	2	151
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1811	1485	1900	1870	1796	1826	1870	1870	1900	1841	1900	1870
Adj Flow Rate, veh/h	66	323	1	0	671	152	0	0	8	194	2	186
Peak Hour Factor	0.82	0.82	0.82	0.86	0.86	0.86	0.38	0.38	0.38	0.81	0.81	0.81
Percent Heavy Veh, %	6	28	0	2	7	5	2	2	0	4	0	2
Cap, veh/h	139	868	3	0	764	658	0	0	16	282	3	257
Arrive On Green	0.08	0.59	0.59	0.00	0.43	0.43	0.00	0.00	0.01	0.16	0.16	0.16
Sat Flow, veh/h	1725	1480	5	0	1796	1547	0	0	1585	1753	17	1596
Grp Volume(v), veh/h	66	0	324	0	671	152	0	0	8	194	0	188
Grp Sat Flow(s),veh/h/ln	1725	0	1484	0	1796	1547	0	0	1585	1753	0	1613
Q Serve(g_s), s	2.3	0.0	7.2	0.0	21.2	3.9	0.0	0.0	0.3	6.5	0.0	6.9
Cycle Q Clear(g_c), s	2.3	0.0	7.2	0.0	21.2	3.9	0.0	0.0	0.3	6.5	0.0	6.9
Prop In Lane	1.00		0.00	0.00		1.00	0.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	139	0	871	0	764	658	0	0	16	282	0	259
V/C Ratio(X)	0.47	0.00	0.37	0.00	0.88	0.23	0.00	0.00	0.49	0.69	0.00	0.72
Avail Cap(c_a), veh/h	501	0	1293	0	899	774	0	0	460	509	0	468
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.2	0.0	6.8	0.0	16.3	11.3	0.0	0.0	30.5	24.5	0.0	24.7
Incr Delay (d2), s/veh	2.5	0.0	0.3	0.0	8.8	0.2	0.0	0.0	20.5	3.0	0.0	3.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	1.8	0.0	9.4	1.2	0.0	0.0	0.2	2.7	0.0	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	29.7	0.0	7.0	0.0	25.1	11.5	0.0	0.0	51.0	27.5	0.0	28.5
LnGrp LOS	C		A		C		B		D		C	
Approach Vol, veh/h	390			823			8			382		
Approach Delay, s/veh	10.9			22.6			51.0			28.0		
Approach LOS	B			C			D			C		
Timer - Assigned Phs	2			4		5	6		8			
Phs Duration (G+Y+Rc), s	41.4			15.0		10.0	31.4		5.6			
Change Period (Y+Rc), s	5.0			5.0		5.0	5.0		5.0			
Max Green Setting (Gmax), s	54.0			18.0		18.0	31.0		18.0			
Max Q Clear Time (g_c+I1), s	9.2			8.9		4.3	23.2		2.3			
Green Ext Time (p_c), s	2.2			1.1		0.1	3.1		0.0			
Intersection Summary												
HCM 7th Control Delay, s/veh				21.2								
HCM 7th LOS				C								

HCM 6th TWSC
3: Chambers Rd & 100th Ave

Existing AM
Chambers Rd Apartments Traffic Impact Study

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	10	17	57	8	133	3	252	32	116	262	4
Future Vol, veh/h	6	10	17	57	8	133	3	252	32	116	262	4
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	100	-	-	-	-	-	-	-	-
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	7	11	18	62	9	145	3	274	35	126	285	4
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	914	854	287	852	839	292	289	0	0	309	0	0
Stage 1	539	539	-	298	298	-	-	-	-	-	-	-
Stage 2	375	315	-	554	541	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	254	296	752	280	302	747	1273	-	-	1252	-	-
Stage 1	527	522	-	711	667	-	-	-	-	-	-	-
Stage 2	646	656	-	517	521	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	181	260	752	240	265	747	1273	-	-	1252	-	-
Mov Cap-2 Maneuver	181	260	-	240	265	-	-	-	-	-	-	-
Stage 1	525	459	-	709	665	-	-	-	-	-	-	-
Stage 2	513	654	-	433	458	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	16.5		15.7		0.1		2.5					
HCM LOS	C		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1273	-	-	350 240 677	1252	-	-					
HCM Lane V/C Ratio	0.003	-	-	0.102 0.258 0.226	0.101	-	-					
HCM Control Delay (s)	7.8	0	-	16.5 25.1 11.9	8.2	0	-					
HCM Lane LOS	A	A	-	C D B	A	A	-					
HCM 95th %tile Q(veh)	0	-	-	0.3 1 0.9	0.3	-	-					

HCM 7th TWSC
4: Sable Blvd & E. 104th Ave

Existing AM
Chambers Rd Apartments Traffic Impact Study

Intersection						
Int Delay, s/veh	28.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	1065	6	38	1276	105	63
Future Vol, veh/h	1065	6	38	1276	105	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	70	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1158	7	41	1387	114	68

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	1164
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.2
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.25
Pot Cap-1 Maneuver	-	-	579
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	579
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.34	\$ 436.21
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	53	456	-	-	579	-
HCM Lane V/C Ratio	2.137	0.15	-	-	0.071	-
HCM Control Delay (s/veh)	\$ 689.4	14.3	-	-	11.7	-
HCM Lane LOS	F	B	-	-	B	-
HCM 95th %tile Q(veh)	11.4	0.5	-	-	0.2	-

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

Timings

1: Chambers Rd & E. 104th Ave

Existing PM

Chambers Rd Apartments Traffic Impact Study

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	 	 	 	 			 	 	 
Traffic Volume (vph)	251	919	119	924	291	274	315	352	321
Future Volume (vph)	251	919	119	924	291	274	315	352	321
Turn Type	Prot	NA	Prot	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6		7	4	3	8
Permitted Phases					6	4		8	
Detector Phase	5	2	1	6	6	7	4	3	8
Switch Phase									
Minimum Initial (s)	10.0	15.0	10.0	15.0	15.0	10.0	15.0	10.0	15.0
Minimum Split (s)	15.0	24.0	15.0	24.5	24.5	15.0	24.0	15.0	24.5
Total Split (s)	19.0	41.0	19.0	41.0	41.0	25.0	35.0	25.0	35.0
Total Split (%)	15.8%	34.2%	15.8%	34.2%	34.2%	20.8%	29.2%	20.8%	29.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
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	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effect Green (s)	15.1	48.0	11.4	44.4	44.4	44.0	25.1	37.1	21.6
Actuated g/C Ratio	0.13	0.40	0.10	0.37	0.37	0.37	0.21	0.31	0.18
v/c Ratio	0.69	0.97	0.49	0.94	0.47	0.86	0.66	0.63	0.76
Control Delay (s/veh)	59.2	54.1	56.7	53.0	5.2	52.4	43.1	30.5	50.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	59.2	54.1	56.7	53.0	5.2	52.4	43.1	30.5	50.8
LOS	E	D	E	D	A	D	D	C	D
Approach Delay (s/veh)		55.0		42.9			46.6		41.6
Approach LOS		E		D			D		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 1 (1%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay (s/veh): 47.1

Intersection LOS: D

Intersection Capacity Utilization 85.2%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Chambers Rd & E. 104th Ave

 Ø1 19 s	 Ø2 (R) 41 s	 Ø3 25 s	 Ø4 35 s
 Ø5 19 s	 Ø6 (R) 41 s	 Ø7 25 s	 Ø8 35 s

Queues

Existing PM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	289	1311	155	1200	378	304	497	400	489
v/c Ratio	0.69	0.97	0.49	0.94	0.47	0.86	0.66	0.63	0.76
Control Delay (s/veh)	59.2	54.1	56.7	53.0	5.2	52.4	43.1	30.5	50.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	59.2	54.1	56.7	53.0	5.2	52.4	43.1	30.5	50.8
Queue Length 50th (ft)	111	512	59	479	0	172	167	109	177
Queue Length 95th (ft)	152	#742	78	#550	27	#289	217	131	217
Internal Link Dist (ft)		3830		955			548		948
Turn Bay Length (ft)	275		380		350	290		285	
Base Capacity (vph)	432	1351	389	1271	807	368	884	770	879
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	0.67	0.97	0.40	0.94	0.47	0.83	0.56	0.52	0.56

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: Chambers Rd & E. 104th Ave

Existing PM
Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	251	919	222	119	924	291	274	315	132	352	321	109
Future Volume (veh/h)	251	919	222	119	924	291	274	315	132	352	321	109
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	289	1056	255	155	1200	0	304	350	147	400	365	124
Peak Hour Factor	0.87	0.87	0.87	0.77	0.77	0.77	0.90	0.90	0.90	0.88	0.88	0.88
Percent Heavy Veh, %	5	5	5	5	5	5	2	2	2	2	2	2
Cap, veh/h	345	1179	283	280	1407		366	512	211	653	447	150
Arrive On Green	0.10	0.43	0.43	0.08	0.41	0.00	0.15	0.21	0.21	0.12	0.17	0.17
Sat Flow, veh/h	3374	2774	667	3374	3469	1547	1781	2452	1013	3456	2614	875
Grp Volume(v), veh/h	289	658	653	155	1200	0	304	252	245	400	246	243
Grp Sat Flow(s),veh/h/ln	1687	1735	1706	1687	1735	1547	1781	1777	1688	1728	1777	1713
Q Serve(g_s), s	10.1	42.2	42.7	5.3	37.7	0.0	16.3	15.7	16.1	11.2	16.0	16.4
Cycle Q Clear(g_c), s	10.1	42.2	42.7	5.3	37.7	0.0	16.3	15.7	16.1	11.2	16.0	16.4
Prop In Lane	1.00		0.39	1.00		1.00	1.00		0.60	1.00		0.51
Lane Grp Cap(c), veh/h	345	737	725	280	1407		366	371	352	653	304	293
V/C Ratio(X)	0.84	0.89	0.90	0.55	0.85		0.83	0.68	0.70	0.61	0.81	0.83
Avail Cap(c_a), veh/h	394	737	725	394	1407		388	444	422	826	444	428
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.9	32.0	32.1	52.9	32.4	0.0	33.5	43.8	44.0	35.1	47.9	48.0
Incr Delay (d2), s/veh	13.2	15.4	16.4	1.7	6.7	0.0	13.5	3.2	3.9	0.9	7.1	8.5
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	19.7	19.8	2.3	16.2	0.0	8.2	7.1	7.0	4.7	7.5	7.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	66.1	47.4	48.5	54.6	39.1	0.0	47.1	47.0	47.8	36.1	54.9	56.5
LnGrp LOS	E	D	D	D	D		D	D	D	D	D	E
Approach Vol, veh/h	1600			1355			801			889		
Approach Delay, s/veh	51.2			40.9			47.3			46.9		
Approach LOS	D			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.9	56.0	19.0	30.0	17.3	53.7	23.5	25.5				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	14.0	36.0	20.0	30.0	14.0	36.0	20.0	30.0				
Max Q Clear Time (g_c+I1), s	7.3	44.7	13.2	18.1	12.1	39.7	18.3	18.4				
Green Ext Time (p_c), s	0.2	0.0	0.8	2.2	0.2	0.0	0.2	2.1				

Intersection Summary

HCM 7th Control Delay, s/veh	46.7
HCM 7th LOS	D

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Chambers Rd & 96th Ave

Existing PM

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	249	788	598	167	1	182	1
Future Volume (vph)	249	788	598	167	1	182	1
Turn Type	Prot	NA	NA	Perm	NA	Split	NA
Protected Phases	5	2	6		8	4	4
Permitted Phases				6			
Detector Phase	5	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	49.0	26.0	26.0	23.0	23.0	23.0
Total Split (%)	24.2%	51.6%	27.4%	27.4%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	Min	None	None	None	None	None
Act Effect Green (s)	14.7	41.3	21.5	21.5	5.8	13.0	13.0
Actuated g/C Ratio	0.22	0.62	0.32	0.32	0.09	0.20	0.20
v/c Ratio	0.64	0.71	1.23	0.28	0.03	0.61	0.22
Control Delay (s/veh)	33.0	15.1	144.3	5.4	28.0	33.8	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	33.0	15.1	144.3	5.4	28.0	33.8	8.5
LOS	C	B	F	A	C	C	A
Approach Delay (s/veh)		19.4	114.0		28.0		26.6
Approach LOS		B	F		C		C

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 66.3

Natural Cycle: 115

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.23

Intersection Signal Delay (s/veh): 55.5

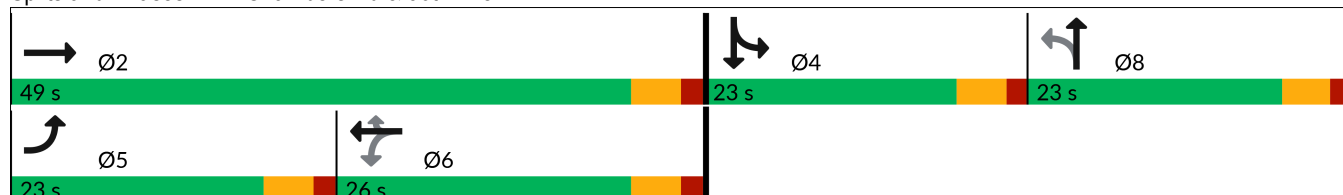
Intersection LOS: E

Intersection Capacity Utilization 102.2%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 2: Chambers Rd & 96th Ave



Queues

Existing PM

2: Chambers Rd & 96th Ave

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	257	812	629	176	4	209	83
v/c Ratio	0.64	0.71	1.23	0.28	0.03	0.61	0.22
Control Delay (s/veh)	33.0	15.1	144.3	5.4	28.0	33.8	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	33.0	15.1	144.3	5.4	28.0	33.8	8.5
Queue Length 50th (ft)	90	174	~311	0	1	75	0
Queue Length 95th (ft)	203	#579	#673	47	6	160	33
Internal Link Dist (ft)		1966	2271		176		2115
Turn Bay Length (ft)	125			300			
Base Capacity (vph)	500	1238	513	637	492	485	499
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.66	1.23	0.28	0.01	0.43	0.17

Intersection Summary

~ 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.

HCM 7th Signalized Intersection Summary

2: Chambers Rd & 96th Ave

Existing PM
Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	249	788	0	0	598	167	0	1	1	182	1	71
Future Volume (veh/h)	249	788	0	0	598	167	0	1	1	182	1	71
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1900	1900	1604	1885	1900	1900	1900	1856	1900	1870
Adj Flow Rate, veh/h	257	812	0	0	629	176	0	2	2	209	1	82
Peak Hour Factor	0.97	0.97	0.97	0.95	0.95	0.95	0.50	0.50	0.50	0.87	0.87	0.87
Percent Heavy Veh, %	0	4	0	0	20	1	0	0	0	3	0	2
Cap, veh/h	318	1098	0	0	544	542	0	5	5	275	3	248
Arrive On Green	0.18	0.60	0.00	0.00	0.34	0.34	0.00	0.01	0.01	0.16	0.16	0.16
Sat Flow, veh/h	1810	1841	0	0	1604	1598	0	872	872	1767	19	1594
Grp Volume(v), veh/h	257	812	0	0	629	176	0	0	4	209	0	83
Grp Sat Flow(s),veh/h/ln	1810	1841	0	0	1604	1598	0	0	1743	1767	0	1613
Q Serve(g_s), s	8.4	19.7	0.0	0.0	21.0	5.1	0.0	0.0	0.1	7.0	0.0	2.8
Cycle Q Clear(g_c), s	8.4	19.7	0.0	0.0	21.0	5.1	0.0	0.0	0.1	7.0	0.0	2.8
Prop In Lane	1.00		0.00	0.00		1.00	0.00		0.50	1.00		0.99
Lane Grp Cap(c), veh/h	318	1098	0	0	544	542	0	0	9	275	0	251
V/C Ratio(X)	0.81	0.74	0.00	0.00	1.16	0.32	0.00	0.00	0.43	0.76	0.00	0.33
Avail Cap(c_a), veh/h	527	1310	0	0	544	542	0	0	507	514	0	469
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.5	9.0	0.0	0.0	20.4	15.2	0.0	0.0	30.7	25.0	0.0	23.2
Incr Delay (d2), s/veh	4.8	1.9	0.0	0.0	89.1	0.3	0.0	0.0	28.0	4.3	0.0	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	6.5	0.0	0.0	20.5	1.7	0.0	0.0	0.1	3.0	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	29.3	10.9	0.0	0.0	109.6	15.5	0.0	0.0	58.6	29.3	0.0	24.0
LnGrp LOS	C	B			F	B			E	C		C
Approach Vol, veh/h	1069			805			4			292		
Approach Delay, s/veh	15.3			89.0			58.6			27.8		
Approach LOS	B			F			E			C		
Timer - Assigned Phs	2			4		5	6		8			
Phs Duration (G+Y+Rc), s	41.9			14.6		15.9	26.0		5.3			
Change Period (Y+Rc), s	5.0			5.0		5.0	5.0		5.0			
Max Green Setting (Gmax), s	44.0			18.0		18.0	21.0		18.0			
Max Q Clear Time (g_c+I1), s	21.7			9.0		10.4	23.0		2.1			
Green Ext Time (p_c), s	6.4			0.7		0.4	0.0		0.0			
Intersection Summary												
HCM 7th Control Delay, s/veh	44.4											
HCM 7th LOS	D											

HCM 6th TWSC
3: Chambers Rd & 100th Ave

Existing PM
Chambers Rd Apartments Traffic Impact Study

Intersection												
Int Delay, s/veh	4.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	5	7	30	7	121	14	353	65	158	267	8
Future Vol, veh/h	4	5	7	30	7	121	14	353	65	158	267	8
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	100	-	-	-	-	-	-	-	-
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	4	5	8	33	8	132	15	384	71	172	290	9
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1159	1124	295	1095	1093	420	299	0	0	455	0	0
Stage 1	639	639	-	450	450	-	-	-	-	-	-	-
Stage 2	520	485	-	645	643	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	173	205	744	191	214	633	1262	-	-	1106	-	-
Stage 1	464	470	-	589	572	-	-	-	-	-	-	-
Stage 2	539	552	-	461	468	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	112	164	744	156	171	633	1262	-	-	1106	-	-
Mov Cap-2 Maneuver	112	164	-	156	171	-	-	-	-	-	-	-
Stage 1	457	382	-	580	563	-	-	-	-	-	-	-
Stage 2	414	543	-	366	380	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	23.5		17.6		0.3		3.2					
HCM LOS	C		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1262	-	-	212 156 552	1106	-	-					
HCM Lane V/C Ratio	0.012	-	-	0.082 0.209 0.252	0.155	-	-					
HCM Control Delay (s)	7.9	0	-	23.5 34.1 13.7	8.9	0	-					
HCM Lane LOS	A	A	-	C D B	A	A	-					
HCM 95th %tile Q(veh)	0	-	-	0.3 0.8 1	0.5	-	-					

HCM 7th TWSC
4: Sable Blvd & E. 104th Ave

Existing PM
Chambers Rd Apartments Traffic Impact Study

Intersection						
Int Delay, s/veh	11.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	1374	19	77	1191	42	48
Future Vol, veh/h	1374	19	77	1191	42	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	70	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	2	2
Mvmt Flow	1493	21	84	1295	46	52
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	1514	0	2318	757
Stage 1	-	-	-	-	1504	-
Stage 2	-	-	-	-	815	-
Critical Hdwy	-	-	4.2	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.25	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	423	-	~ 32	350
Stage 1	-	-	-	-	170	-
Stage 2	-	-	-	-	396	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	423	-	~ 25	350
Mov Cap-2 Maneuver	-	-	-	-	~ 25	-
Stage 1	-	-	-	-	170	-
Stage 2	-	-	-	-	317	-
Approach	EB	WB		NB		
HCM Control Delay, s/v	0	0.95		\$ 341.21		
HCM LOS	F					
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	25	350	-	-	423	-
HCM Lane V/C Ratio	1.801	0.149	-	-	0.198	-
HCM Control Delay (s/veh)	\$ 711.6	17.1	-	-	15.6	-
HCM Lane LOS	F	C	-	-	C	-
HCM 95th %tile Q(veh)	5.6	0.5	-	-	0.7	-
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Timings

1: Chambers Rd & E. 104th Ave

2027 BACK AM

Chambers Rd Apartments Traffic Impact Study

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	112	790	94	1040	207	275	196	242	165
Future Volume (vph)	112	790	94	1040	207	275	196	242	165
Turn Type	Prot	NA	Prot	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6		7	4	3	8
Permitted Phases					6	4		8	
Detector Phase	5	2	1	6	6	7	4	3	8
Switch Phase									
Minimum Initial (s)	3.0	15.0	3.0	15.0	15.0	3.0	5.0	3.0	5.0
Minimum Split (s)	10.5	37.0	10.5	37.0	37.0	10.5	34.7	10.5	34.7
Total Split (s)	22.0	44.0	22.0	44.0	44.0	19.0	35.0	19.0	35.0
Total Split (%)	18.3%	36.7%	18.3%	36.7%	36.7%	15.8%	29.2%	15.8%	29.2%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	4.7	4.7	4.7	4.7
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)	7.0	7.0	7.0	7.0	7.0	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	Max
Act Effect Green (s)	9.9	42.6	9.4	42.1	42.1	41.8	29.5	39.4	28.3
Actuated g/C Ratio	0.08	0.36	0.08	0.35	0.35	0.35	0.25	0.33	0.24
v/c Ratio	0.46	0.89	0.43	1.04	0.36	0.88	0.40	0.37	0.45
Control Delay (s/veh)	67.5	39.1	57.5	75.2	5.2	57.4	27.7	25.8	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	67.5	39.1	57.5	75.2	5.2	57.4	27.7	25.8	17.8
LOS	E	D	E	E	A	E	C	C	B
Approach Delay (s/veh)		42.1		63.2			41.4		20.8
Approach LOS		D		E			D		C

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 8 (7%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 105

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay (s/veh): 46.6

Intersection LOS: D

Intersection Capacity Utilization 81.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Chambers Rd & E. 104th Ave

 Ø1 22 s	 Ø2 (R) 44 s	 Ø3 19 s	 Ø4 35 s
 Ø5 22 s	 Ø6 (R) 44 s	 Ø7 19 s	 Ø8 35 s

Queues

2027 BACK AM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	127	1068	113	1253	249	313	365	266	424
v/c Ratio	0.46	0.89	0.43	1.04	0.36	0.88	0.40	0.37	0.45
Control Delay (s/veh)	67.5	39.1	57.5	75.2	5.2	57.4	27.7	25.8	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	67.5	39.1	57.5	75.2	5.2	57.4	27.7	25.8	17.8
Queue Length 50th (ft)	54	402	43	~551	2	176	85	69	60
Queue Length 95th (ft)	85	#515	66	#629	43	#252	129	99	108
Internal Link Dist (ft)		3830		955			548		948
Turn Bay Length (ft)	275		380		350	290		285	
Base Capacity (vph)	416	1203	416	1206	699	354	904	760	948
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	0.89	0.27	1.04	0.36	0.88	0.40	0.35	0.45

Intersection Summary

~ 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.

HCM 7th Signalized Intersection Summary

1: Chambers Rd & E. 104th Ave

2027 BACK AM

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	112	790	150	94	1040	207	275	196	125	242	165	221
Future Volume (veh/h)	112	790	150	94	1040	207	275	196	125	242	165	221
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	127	898	170	113	1253	0	312	223	142	266	181	243
Peak Hour Factor	0.88	0.88	0.88	0.83	0.83	0.83	0.88	0.88	0.88	0.91	0.91	0.91
Percent Heavy Veh, %	5	5	5	5	5	5	2	2	2	2	2	2
Cap, veh/h	184	1116	211	168	1314		336	555	339	721	419	374
Arrive On Green	0.05	0.38	0.38	0.05	0.38	0.00	0.10	0.26	0.26	0.08	0.24	0.24
Sat Flow, veh/h	3374	2911	551	3374	3469	1547	1781	2120	1295	3456	1777	1585
Grp Volume(v), veh/h	127	535	533	113	1253	0	312	185	180	266	181	243
Grp Sat Flow(s),veh/h/ln	1687	1735	1727	1687	1735	1547	1781	1777	1637	1728	1777	1585
Q Serve(g_s), s	4.4	33.0	33.0	4.0	42.1	0.0	12.3	10.3	10.9	6.9	10.4	16.6
Cycle Q Clear(g_c), s	4.4	33.0	33.0	4.0	42.1	0.0	12.3	10.3	10.9	6.9	10.4	16.6
Prop In Lane	1.00		0.32	1.00		1.00	1.00		0.79	1.00		1.00
Lane Grp Cap(c), veh/h	184	665	662	168	1314		336	465	429	721	419	374
V/C Ratio(X)	0.69	0.80	0.80	0.67	0.95		0.93	0.40	0.42	0.37	0.43	0.65
Avail Cap(c_a), veh/h	422	665	662	422	1314		336	465	429	812	419	374
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.85	0.85	0.85	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.7	33.0	33.0	56.0	36.2	0.0	38.1	36.5	36.7	31.0	39.0	41.4
Incr Delay (d2), s/veh	3.9	8.6	8.7	4.6	16.0	0.0	31.0	0.6	0.7	0.3	3.2	8.5
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	14.7	14.7	1.8	19.7	0.0	6.2	4.5	4.4	2.9	4.8	7.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	59.6	41.6	41.7	60.6	52.2	0.0	69.1	37.0	37.4	31.4	42.2	49.9
LnGrp LOS	E	D	D	E	D		E	D	D	C	D	D
Approach Vol, veh/h	1195			1366			677			690		
Approach Delay, s/veh	43.6			52.9			51.9			40.7		
Approach LOS	D			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.0	53.0	15.9	38.1	13.5	52.5	19.0	35.0				
Change Period (Y+Rc), s	7.0	7.0	6.7	6.7	7.0	7.0	6.7	6.7				
Max Green Setting (Gmax), s	15.0	37.0	12.3	28.3	15.0	37.0	12.3	28.3				
Max Q Clear Time (g_c+I1), s	6.0	35.0	8.9	12.9	6.4	44.1	14.3	18.6				
Green Ext Time (p_c), s	0.2	1.2	0.3	1.8	0.2	0.0	0.0	1.7				

Intersection Summary

HCM 7th Control Delay, s/veh 47.7

HCM 7th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Chambers Rd & 96th Ave

2027 BACK AM

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	59	288	627	142	0	171	2
Future Volume (vph)	59	288	627	142	0	171	2
Turn Type	Prot	NA	NA	Perm	NA	Split	NA
Protected Phases	5	2	6		8	4	4
Permitted Phases				6			
Detector Phase	5	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	59.0	36.0	36.0	23.0	23.0	23.0
Total Split (%)	21.9%	56.2%	34.3%	34.3%	21.9%	21.9%	21.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	Min	None	None	None	None	None
Act Effect Green (s)	8.5	43.0	32.3	32.3	5.7	13.5	13.5
Actuated g/C Ratio	0.12	0.63	0.47	0.47	0.08	0.20	0.20
v/c Ratio	0.34	0.38	0.87	0.21	0.02	0.62	0.43
Control Delay (s/veh)	35.1	8.8	34.2	5.1	0.0	35.3	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	35.1	8.8	34.2	5.1	0.0	35.3	7.8
LOS	D	A	C	A	A	D	A
Approach Delay (s/veh)		13.3	28.9				21.8
Approach LOS		B	C				C

Intersection Summary

Cycle Length: 105

Actuated Cycle Length: 68.5

Natural Cycle: 115

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.87

Intersection Signal Delay (s/veh): 23.2

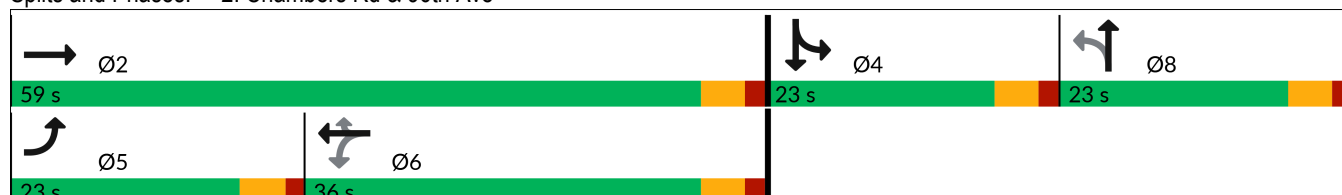
Intersection LOS: C

Intersection Capacity Utilization 73.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: Chambers Rd & 96th Ave



Queues

2027 BACK AM

2: Chambers Rd & 96th Ave

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	72	352	729	165	8	211	204
v/c Ratio	0.34	0.38	0.87	0.21	0.02	0.62	0.43
Control Delay (s/veh)	35.1	8.8	34.2	5.1	0.0	35.3	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	35.1	8.8	34.2	5.1	0.0	35.3	7.8
Queue Length 50th (ft)	28	58	269	5	0	81	1
Queue Length 95th (ft)	69	147	#637	43	0	155	40
Internal Link Dist (ft)		1966	2271		176		2115
Turn Bay Length (ft)	125			300			
Base Capacity (vph)	461	1187	836	800	729	470	576
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.30	0.87	0.21	0.01	0.45	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

2: Chambers Rd & 96th Ave

2027 BACK AM

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	288	1	0	627	142	0	0	3	171	2	164
Future Volume (veh/h)	59	288	1	0	627	142	0	0	3	171	2	164
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1811	1485	1900	1900	1796	1826	1900	1900	1900	1841	1900	1870
Adj Flow Rate, veh/h	72	351	1	0	729	165	0	0	8	211	2	202
Peak Hour Factor	0.82	0.82	0.82	0.86	0.86	0.86	0.38	0.38	0.38	0.81	0.81	0.81
Percent Heavy Veh, %	6	28	0	0	7	5	0	0	0	4	0	2
Cap, veh/h	131	879	3	0	794	684	0	0	17	295	3	269
Arrive On Green	0.08	0.59	0.59	0.00	0.44	0.44	0.00	0.00	0.01	0.17	0.17	0.17
Sat Flow, veh/h	1725	1480	4	0	1796	1547	0	0	1610	1753	16	1597
Grp Volume(v), veh/h	72	0	352	0	729	165	0	0	8	211	0	204
Grp Sat Flow(s),veh/h/ln	1725	0	1484	0	1796	1547	0	0	1610	1753	0	1613
Q Serve(g_s), s	2.7	0.0	8.3	0.0	25.1	4.4	0.0	0.0	0.3	7.5	0.0	7.9
Cycle Q Clear(g_c), s	2.7	0.0	8.3	0.0	25.1	4.4	0.0	0.0	0.3	7.5	0.0	7.9
Prop In Lane	1.00		0.00	0.00		1.00	0.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	131	0	881	0	794	684	0	0	17	295	0	271
V/C Ratio(X)	0.55	0.00	0.40	0.00	0.92	0.24	0.00	0.00	0.48	0.72	0.00	0.75
Avail Cap(c_a), veh/h	471	0	1217	0	845	728	0	0	440	479	0	441
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.4	0.0	7.1	0.0	17.3	11.5	0.0	0.0	32.4	25.9	0.0	26.1
Incr Delay (d2), s/veh	3.6	0.0	0.3	0.0	14.4	0.2	0.0	0.0	19.9	3.2	0.0	4.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	2.2	0.0	12.2	1.4	0.0	0.0	0.2	3.1	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	32.9	0.0	7.4	0.0	31.6	11.7	0.0	0.0	52.3	29.1	0.0	30.3
LnGrp LOS	C		A		C		B		D		C	
Approach Vol, veh/h	424			894			8			415		
Approach Delay, s/veh	11.8			28.0			52.3			29.7		
Approach LOS	B			C			D			C		
Timer - Assigned Phs	2			4		5	6		8			
Phs Duration (G+Y+Rc), s	44.1			16.1		10.0	34.1		5.7			
Change Period (Y+Rc), s	5.0			5.0		5.0	5.0		5.0			
Max Green Setting (Gmax), s	54.0			18.0		18.0	31.0		18.0			
Max Q Clear Time (g_c+I1), s	10.3			9.9		4.7	27.1		2.3			
Green Ext Time (p_c), s	2.5			1.2		0.1	2.0		0.0			
Intersection Summary												
HCM 7th Control Delay, s/veh	24.5											
HCM 7th LOS	C											

HCM 6th TWSC
3: Chambers Rd & 100th Ave

Year 2027 Background AM
Chambers Rd Apartments Traffic Impact Study

Intersection												
Int Delay, s/veh	9.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	73	11	31	62	9	145	13	300	35	126	297	26
Future Vol, veh/h	73	11	31	62	9	145	13	300	35	126	297	26
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	100	-	-	235	-	-	235	-	135
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	79	12	34	67	10	158	14	326	38	137	323	28

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1054	989	323	1007	998	345	351	0	0	364	0	0
Stage 1	597	597	-	373	373	-	-	-	-	-	-	-
Stage 2	457	392	-	634	625	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	204	247	718	219	244	698	1208	-	-	1195	-	-
Stage 1	490	491	-	648	618	-	-	-	-	-	-	-
Stage 2	583	606	-	467	477	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	138	216	718	181	213	698	1208	-	-	1195	-	-
Mov Cap-2 Maneuver	138	216	-	181	213	-	-	-	-	-	-	-
Stage 1	484	435	-	640	611	-	-	-	-	-	-	-
Stage 2	439	599	-	383	422	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	44.2		19.7		0.3		2.4	
HCM LOS	E		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1208	-	-	138	446	181	616	1195	-	-
HCM Lane V/C Ratio	0.012	-	-	0.575	0.102	0.372	0.272	0.115	-	-
HCM Control Delay (s)	8	-	-	61.5	14	36.2	13	8.4	-	-
HCM Lane LOS	A	-	-	F	B	E	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	2.9	0.3	1.6	1.1	0.4	-	-

Timings

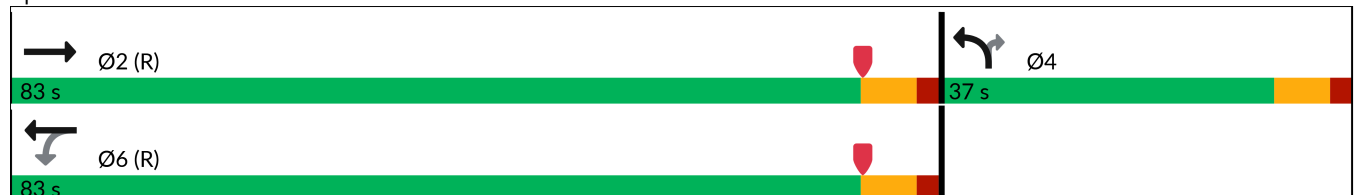
4: Sable Blvd & E. 104th Ave

2027 BACK AM

Chambers Rd Apartments Traffic Impact Study

	→	↖	←	↙	↗
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↱	↱	↑↑	↱	↱
Traffic Volume (vph)	1172	46	1428	180	81
Future Volume (vph)	1172	46	1428	180	81
Turn Type	NA	Perm	NA	Prot	Perm
Protected Phases	2		6	4	
Permitted Phases		6			4
Detector Phase	2	6	6	4	4
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	37.0	22.5	22.5	35.0	35.0
Total Split (s)	83.0	83.0	83.0	37.0	37.0
Total Split (%)	69.2%	69.2%	69.2%	30.8%	30.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	87.4	87.4	87.4	18.6	18.6
Actuated g/C Ratio	0.73	0.73	0.73	0.16	0.16
v/c Ratio	0.52	0.21	0.62	0.72	0.29
Control Delay (s/veh)	8.6	4.8	4.7	62.3	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.6	4.8	4.7	62.3	14.5
LOS	A	A	A	E	B
Approach Delay (s/veh)	8.6		4.7	47.5	
Approach LOS	A		A	D	
Intersection Summary					
Cycle Length: 120					
Actuated Cycle Length: 120					
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow					
Natural Cycle: 80					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 0.72					
Intersection Signal Delay (s/veh): 10.1			Intersection LOS: B		
Intersection Capacity Utilization 61.1%			ICU Level of Service B		
Analysis Period (min) 15					

Splits and Phases: 4: Sable Blvd & E. 104th Ave



Queues

2027 BACK AM

4: Sable Blvd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

	→	↙	←	↖	↗
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1308	50	1552	196	88
v/c Ratio	0.52	0.21	0.62	0.72	0.29
Control Delay (s/veh)	8.6	4.8	4.7	62.3	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.6	4.8	4.7	62.3	14.5
Queue Length 50th (ft)	204	6	104	146	9
Queue Length 95th (ft)	311	m9	m123	214	53
Internal Link Dist (ft)	491		3830	1801	
Turn Bay Length (ft)		300		70	
Base Capacity (vph)	2495	235	2504	442	452
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.52	0.21	0.62	0.44	0.19

Intersection Summary

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

HCM 7th Signalized Intersection Summary

4: Sable Blvd & E. 104th Ave

2027 BACK AM

Chambers Rd Apartments Traffic Impact Study

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1172	31	46	1428	180	81
Future Volume (veh/h)	1172	31	46	1428	180	81
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1870	1870
Adj Flow Rate, veh/h	1274	34	50	1552	196	88
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	2	2
Cap, veh/h	2599	69	310	2612	232	207
Arrive On Green	0.75	0.75	0.75	0.75	0.13	0.13
Sat Flow, veh/h	3543	92	411	3561	1781	1585
Grp Volume(v), veh/h	640	668	50	1552	196	88
Grp Sat Flow(s),veh/h/ln	1735	1809	411	1735	1781	1585
Q Serve(g_s), s	17.3	17.4	6.5	24.0	12.9	6.1
Cycle Q Clear(g_c), s	17.3	17.4	23.9	24.0	12.9	6.1
Prop In Lane		0.05	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1306	1362	310	2612	232	207
V/C Ratio(X)	0.49	0.49	0.16	0.59	0.84	0.43
Avail Cap(c_a), veh/h	1306	1362	310	2612	445	396
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.09	0.09	1.00	1.00
Uniform Delay (d), s/veh	5.8	5.8	10.5	6.6	51.0	48.0
Incr Delay (d2), s/veh	1.3	1.3	0.1	0.1	8.1	1.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	6.2	0.6	7.6	6.3	2.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	7.1	7.1	10.6	6.7	59.1	49.4
LnGrp LOS	A	A	B	A	E	D
Approach Vol, veh/h	1308			1602	284	
Approach Delay, s/veh	7.1			6.8	56.1	
Approach LOS	A			A	E	
Timer - Assigned Phs	2		4		6	
Phs Duration (G+Y+Rc), s	97.4		22.6		97.4	
Change Period (Y+Rc), s	7.0		7.0		7.0	
Max Green Setting (Gmax), s	76.0		30.0		76.0	
Max Q Clear Time (g_c+I1), s	19.4		14.9		26.0	
Green Ext Time (p_c), s	13.2		0.7		21.0	
Intersection Summary						
HCM 7th Control Delay, s/veh			11.3			
HCM 7th LOS			B			

HCM 6th TWSC
5: Sable Blvd & 102nd Ave

Year 2027 Background AM
Chambers Rd Apartments Traffic Impact Study

Intersection												
Int Delay, s/veh	5.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	53	0	26	0	19	10	0
Future Vol, veh/h	0	0	0	0	0	53	0	26	0	19	10	0
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	58	0	28	0	21	11	0
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	110	81	11	81	81	28	11	0	0	28	0	0
Stage 1	53	53	-	28	28	-	-	-	-	-	-	-
Stage 2	57	28	-	53	53	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	868	809	1070	907	809	1047	1608	-	-	1585	-	-
Stage 1	960	851	-	989	872	-	-	-	-	-	-	-
Stage 2	955	872	-	960	851	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	812	798	1070	898	798	1047	1608	-	-	1585	-	-
Mov Cap-2 Maneuver	812	798	-	898	798	-	-	-	-	-	-	-
Stage 1	960	840	-	989	872	-	-	-	-	-	-	-
Stage 2	902	872	-	948	840	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0		8.6			0			4.8			
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1608	-	-	-	-	1047	1585	-	-			
HCM Lane V/C Ratio	-	-	-	-	-	0.055	0.013	-	-			
HCM Control Delay (s)	0	-	-	0	8.6	7.3	0	-				
HCM Lane LOS	A	-	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0	-	-				

Timings

1: Chambers Rd & E. 104th Ave

2027 BACK PM

Chambers Rd Apartments Traffic Impact Study

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	 	 	 	 			 	 	 
Traffic Volume (vph)	239	874	116	879	277	262	300	335	306
Future Volume (vph)	239	874	116	879	277	262	300	335	306
Turn Type	Prot	NA	Prot	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6		7	4	3	8
Permitted Phases					6	4		8	
Detector Phase	5	2	1	6	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)	12.5	24.0	11.0	24.5	24.5	11.0	24.0	11.0	24.5
Total Split (s)	19.0	41.0	19.0	41.0	41.0	25.0	35.0	25.0	35.0
Total Split (%)	15.8%	34.2%	15.8%	34.2%	34.2%	20.8%	29.2%	20.8%	29.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
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	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effect Green (s)	14.8	49.9	10.8	45.9	45.9	42.9	24.2	35.8	20.6
Actuated g/C Ratio	0.12	0.42	0.09	0.38	0.38	0.36	0.20	0.30	0.17
v/c Ratio	0.67	0.89	0.51	0.87	0.44	0.83	0.66	0.60	0.75
Control Delay (s/veh)	61.9	37.1	57.7	44.0	5.1	49.1	43.2	30.8	51.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	61.9	37.1	57.7	44.0	5.1	49.1	43.2	30.8	51.3
LOS	E	D	E	D	A	D	D	C	D
Approach Delay (s/veh)		41.6		36.8			45.4		42.1
Approach LOS		D		D			D		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 1 (1%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay (s/veh): 40.6

Intersection LOS: D

Intersection Capacity Utilization 78.1%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Chambers Rd & E. 104th Ave

 Ø1 19 s	 Ø2 (R) 41 s	 Ø3 25 s	 Ø4 35 s
 Ø5 19 s	 Ø6 (R) 41 s	 Ø7 25 s	 Ø8 35 s

Queues

2027 BACK PM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	275	1250	151	1142	360	291	474	381	465
v/c Ratio	0.67	0.89	0.51	0.87	0.44	0.83	0.66	0.60	0.75
Control Delay (s/veh)	61.9	37.1	57.7	44.0	5.1	49.1	43.2	30.8	51.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	61.9	37.1	57.7	44.0	5.1	49.1	43.2	30.8	51.3
Queue Length 50th (ft)	115	353	58	435	0	166	157	105	168
Queue Length 95th (ft)	155	#467	77	#506	27	#263	207	127	208
Internal Link Dist (ft)		3830		955			548		948
Turn Bay Length (ft)	275		380		350	290		285	
Base Capacity (vph)	430	1402	389	1314	810	368	884	772	879
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	0.64	0.89	0.39	0.87	0.44	0.79	0.54	0.49	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

2027 BACK PM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	239	874	213	116	879	277	262	300	127	335	306	103
Future Volume (veh/h)	239	874	213	116	879	277	262	300	127	335	306	103
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	275	1005	245	151	1142	0	291	333	141	381	348	117
Peak Hour Factor	0.87	0.87	0.87	0.77	0.77	0.77	0.90	0.90	0.90	0.88	0.88	0.88
Percent Heavy Veh, %	5	5	5	5	5	5	2	2	2	2	2	2
Cap, veh/h	332	1265	307	209	1460		359	492	204	640	430	142
Arrive On Green	0.10	0.46	0.46	0.06	0.42	0.00	0.15	0.20	0.20	0.11	0.16	0.16
Sat Flow, veh/h	3374	2767	672	3374	3469	1547	1781	2447	1017	3456	2623	868
Grp Volume(v), veh/h	275	629	621	151	1142	0	291	240	234	381	234	231
Grp Sat Flow(s),veh/h/ln	1687	1735	1705	1687	1735	1547	1781	1777	1687	1728	1777	1714
Q Serve(g_s), s	9.6	37.0	37.3	5.3	34.1	0.0	15.8	15.0	15.4	10.7	15.2	15.6
Cycle Q Clear(g_c), s	9.6	37.0	37.3	5.3	34.1	0.0	15.8	15.0	15.4	10.7	15.2	15.6
Prop In Lane	1.00		0.39	1.00		1.00	1.00		0.60	1.00		0.51
Lane Grp Cap(c), veh/h	332	793	780	209	1460		359	357	339	640	292	281
V/C Ratio(X)	0.83	0.79	0.80	0.72	0.78		0.81	0.67	0.69	0.60	0.80	0.82
Avail Cap(c_a), veh/h	394	793	780	394	1460		388	444	422	825	444	429
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.71	0.71	0.71	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.1	27.7	27.8	55.3	30.0	0.0	34.2	44.3	44.5	35.9	48.3	48.5
Incr Delay (d2), s/veh	8.7	5.8	6.0	4.6	4.2	0.0	11.6	2.8	3.5	0.9	6.1	7.5
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	15.6	15.5	2.3	14.3	0.0	7.8	6.7	6.7	4.5	7.1	7.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	61.8	33.5	33.8	59.9	34.3	0.0	45.8	47.1	47.9	36.8	54.3	55.9
LnGrp LOS	E	C	C	E	C		D	D	D	D	D	E
Approach Vol, veh/h	1525			1293			765			846		
Approach Delay, s/veh	38.8			37.2			46.9			46.9		
Approach LOS	D			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.4	59.9	18.6	29.1	16.8	55.5	23.0	24.7				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	14.0	36.0	20.0	30.0	14.0	36.0	20.0	30.0				
Max Q Clear Time (g_c+l1), s	7.3	39.3	12.7	17.4	11.6	36.1	17.8	17.6				
Green Ext Time (p_c), s	0.2	0.0	0.8	2.1	0.2	0.0	0.2	2.1				

Intersection Summary

HCM 7th Control Delay, s/veh 41.3

HCM 7th LOS D

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Chambers Rd & 96th Ave

2027 BACK PM

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	237	749	569	159	1	173	1
Future Volume (vph)	237	749	569	159	1	173	1
Turn Type	Prot	NA	NA	Perm	NA	Split	NA
Protected Phases	5	2	6		8	4	4
Permitted Phases				6			
Detector Phase	5	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	49.0	26.0	26.0	23.0	23.0	23.0
Total Split (%)	24.2%	51.6%	27.4%	27.4%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	Min	None	None	None	None	None
Act Effect Green (s)	14.0	40.6	21.5	21.5	5.8	12.6	12.6
Actuated g/C Ratio	0.21	0.62	0.33	0.33	0.09	0.19	0.19
v/c Ratio	0.63	0.68	1.15	0.26	0.03	0.59	0.21
Control Delay (s/veh)	32.6	13.9	114.4	5.4	28.0	32.8	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.6	13.9	114.4	5.4	28.0	32.8	8.5
LOS	C	B	F	A	C	C	A
Approach Delay (s/veh)		18.4	90.6		28.0		26.0
Approach LOS		B	F		C		C

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 65.2

Natural Cycle: 115

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.15

Intersection Signal Delay (s/veh): 46.2

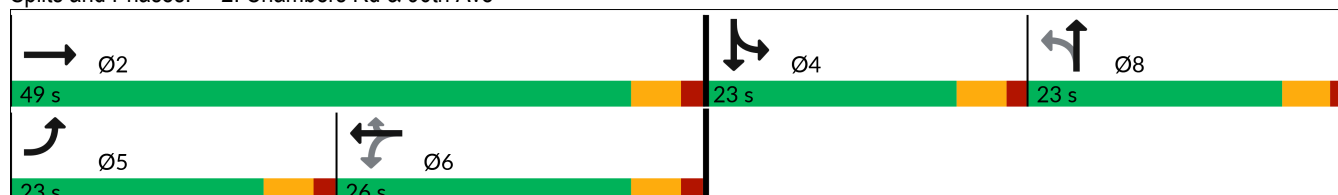
Intersection LOS: D

Intersection Capacity Utilization 98.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Chambers Rd & 96th Ave



Queues

2: Chambers Rd & 96th Ave

2027 BACK PM

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	244	772	599	167	4	199	78
v/c Ratio	0.63	0.68	1.15	0.26	0.03	0.59	0.21
Control Delay (s/veh)	32.6	13.9	114.4	5.4	28.0	32.8	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.6	13.9	114.4	5.4	28.0	32.8	8.5
Queue Length 50th (ft)	84	156	~275	0	1	69	0
Queue Length 95th (ft)	193	473	#638	46	6	153	32
Internal Link Dist (ft)		1966	2271		176		2115
Turn Bay Length (ft)	125			300			
Base Capacity (vph)	509	1260	521	638	501	494	502
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.61	1.15	0.26	0.01	0.40	0.16

Intersection Summary

~ 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.

HCM 7th Signalized Intersection Summary

2: Chambers Rd & 96th Ave

2027 BACK PM

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	237	749	0	0	569	159	0	1	1	173	1	67
Future Volume (veh/h)	237	749	0	0	569	159	0	1	1	173	1	67
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1900	1900	1604	1885	1900	1900	1900	1856	1900	1870
Adj Flow Rate, veh/h	244	772	0	0	599	167	0	2	2	199	1	77
Peak Hour Factor	0.97	0.97	0.97	0.95	0.95	0.95	0.50	0.50	0.50	0.87	0.87	0.87
Percent Heavy Veh, %	0	4	0	0	20	1	0	0	0	3	0	2
Cap, veh/h	307	1100	0	0	554	552	0	5	5	266	3	239
Arrive On Green	0.17	0.60	0.00	0.00	0.35	0.35	0.00	0.01	0.01	0.15	0.15	0.15
Sat Flow, veh/h	1810	1841	0	0	1604	1598	0	872	872	1767	21	1593
Grp Volume(v), veh/h	244	772	0	0	599	167	0	0	4	199	0	78
Grp Sat Flow(s),veh/h/ln	1810	1841	0	0	1604	1598	0	0	1743	1767	0	1613
Q Serve(g_s), s	7.9	17.7	0.0	0.0	21.0	4.6	0.0	0.0	0.1	6.6	0.0	2.6
Cycle Q Clear(g_c), s	7.9	17.7	0.0	0.0	21.0	4.6	0.0	0.0	0.1	6.6	0.0	2.6
Prop In Lane	1.00		0.00	0.00		1.00	0.00		0.50	1.00		0.99
Lane Grp Cap(c), veh/h	307	1100	0	0	554	552	0	0	9	266	0	242
V/C Ratio(X)	0.80	0.70	0.00	0.00	1.08	0.30	0.00	0.00	0.43	0.75	0.00	0.32
Avail Cap(c_a), veh/h	536	1333	0	0	554	552	0	0	516	524	0	478
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.2	8.5	0.0	0.0	19.9	14.5	0.0	0.0	30.1	24.7	0.0	23.0
Incr Delay (d2), s/veh	4.7	1.3	0.0	0.0	61.9	0.3	0.0	0.0	27.9	4.2	0.0	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	5.6	0.0	0.0	16.4	1.6	0.0	0.0	0.1	2.8	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	28.9	9.8	0.0	0.0	81.7	14.8	0.0	0.0	58.1	28.9	0.0	23.8
LnGrp LOS	C	A			F	B			E	C		C
Approach Vol, veh/h	1016			766			4			277		
Approach Delay, s/veh	14.4			67.2			58.1			27.5		
Approach LOS	B			E			E			C		
Timer - Assigned Phs	2			4		5	6		8			
Phs Duration (G+Y+Rc), s	41.3			14.1		15.3	26.0		5.3			
Change Period (Y+Rc), s	5.0			5.0		5.0	5.0		5.0			
Max Green Setting (Gmax), s	44.0			18.0		18.0	21.0		18.0			
Max Q Clear Time (g_c+I1), s	19.7			8.6		9.9	23.0		2.1			
Green Ext Time (p_c), s	6.1			0.7		0.4	0.0		0.0			
Intersection Summary												
HCM 7th Control Delay, s/veh	35.8											
HCM 7th LOS	D											

HCM 6th TWSC
3: Chambers Rd & 100th Ave

Year 2027 Background PM
Chambers Rd Apartments Traffic Impact Study

Intersection												
Int Delay, s/veh	10.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	51	5	17	33	8	132	46	403	71	172	327	80
Future Vol, veh/h	51	5	17	33	8	132	46	403	71	172	327	80
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	100	-	-	235	-	-	235	-	135
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	55	5	18	36	9	143	50	438	77	187	355	87

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1382	1344	355	1361	1393	477	442	0	0	515	0	0
Stage 1	729	729	-	577	577	-	-	-	-	-	-	-
Stage 2	653	615	-	784	816	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	121	152	689	125	142	588	1118	-	-	1051	-	-
Stage 1	414	428	-	502	502	-	-	-	-	-	-	-
Stage 2	456	482	-	386	391	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	72	119	689	98	111	588	1118	-	-	1051	-	-
Mov Cap-2 Maneuver	72	119	-	98	111	-	-	-	-	-	-	-
Stage 1	395	352	-	479	479	-	-	-	-	-	-	-
Stage 2	323	460	-	304	321	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	106.2		24.9		0.7		2.7	
HCM LOS	F		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1118	-	-	72	330	98	472	1051	-	-
HCM Lane V/C Ratio	0.045	-	-	0.77	0.072	0.366	0.322	0.178	-	-
HCM Control Delay (s)	8.4	-	-	144.7	16.8	61.6	16.2	9.2	-	-
HCM Lane LOS	A	-	-	F	C	F	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	3.6	0.2	1.5	1.4	0.6	-	-

Timings

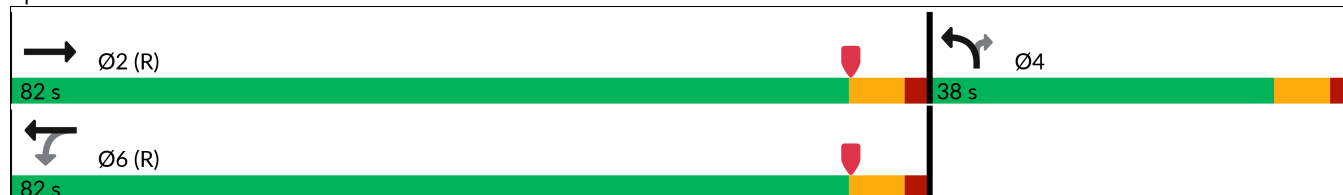
4: Sable Blvd & E. 104th Ave

2027 BACK PM

Chambers Rd Apartments Traffic Impact Study

	→	↖	←	↙	↗
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations					
Traffic Volume (vph)	1540	99	1323	92	61
Future Volume (vph)	1540	99	1323	92	61
Turn Type	NA	Perm	NA	Prot	Perm
Protected Phases	2		6	4	
Permitted Phases		6			4
Detector Phase	2	6	6	4	4
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	37.0	25.0	25.0	35.0	35.0
Total Split (s)	82.0	82.0	82.0	38.0	38.0
Total Split (%)	68.3%	68.3%	68.3%	31.7%	31.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	93.9	93.9	93.9	12.1	12.1
Actuated g/C Ratio	0.78	0.78	0.78	0.10	0.10
v/c Ratio	0.67	0.76	0.53	0.56	0.35
Control Delay (s/veh)	7.9	35.4	3.1	62.7	35.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	7.9	35.4	3.1	62.7	35.2
LOS	A	D	A	E	D
Approach Delay (s/veh)	7.9		5.4	51.8	
Approach LOS	A		A	D	
Intersection Summary					
Cycle Length: 120					
Actuated Cycle Length: 120					
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow					
Natural Cycle: 140					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 0.76					
Intersection Signal Delay (s/veh): 8.8			Intersection LOS: A		
Intersection Capacity Utilization 73.7%			ICU Level of Service D		
Analysis Period (min) 15					

Splits and Phases: 4: Sable Blvd & E. 104th Ave



Queues

2027 BACK PM

4: Sable Blvd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

	→	↙	←	↖	↗
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1779	108	1438	100	66
v/c Ratio	0.67	0.76	0.53	0.56	0.35
Control Delay (s/veh)	7.9	35.4	3.1	62.7	35.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	7.9	35.4	3.1	62.7	35.2
Queue Length 50th (ft)	271	19	64	75	27
Queue Length 95th (ft)	408	m57	78	128	69
Internal Link Dist (ft)	491		3830	1801	
Turn Bay Length (ft)		300		70	
Base Capacity (vph)	2667	143	2688	457	430
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.67	0.76	0.53	0.22	0.15

Intersection Summary

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

HCM 7th Signalized Intersection Summary

4: Sable Blvd & E. 104th Ave

2027 BACK PM

Chambers Rd Apartments Traffic Impact Study

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (veh/h)	1540	97	99	1323	92	61
Future Volume (veh/h)	1540	97	99	1323	92	61
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1870	1870
Adj Flow Rate, veh/h	1674	105	108	1438	100	66
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	2	2
Cap, veh/h	2681	167	219	2804	134	119
Arrive On Green	0.81	0.81	0.81	0.81	0.08	0.08
Sat Flow, veh/h	3408	207	261	3561	1781	1585
Grp Volume(v), veh/h	870	909	108	1438	100	66
Grp Sat Flow(s),veh/h/ln	1735	1789	261	1735	1781	1585
Q Serve(g_s), s	23.1	23.8	33.1	16.3	6.6	4.8
Cycle Q Clear(g_c), s	23.1	23.8	56.9	16.3	6.6	4.8
Prop In Lane		0.12	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1402	1446	219	2804	134	119
V/C Ratio(X)	0.62	0.63	0.49	0.51	0.75	0.55
Avail Cap(c_a), veh/h	1402	1446	219	2804	460	409
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.39	0.39	1.00	1.00
Uniform Delay (d), s/veh	4.4	4.5	15.6	3.8	54.4	53.6
Incr Delay (d2), s/veh	2.1	2.1	3.1	0.3	8.0	4.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	7.4	2.1	4.4	3.3	2.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	6.5	6.6	18.7	4.0	62.4	57.5
LnGrp LOS	A	A	B	A	E	E
Approach Vol, veh/h	1779			1546		166
Approach Delay, s/veh	6.5			5.1		60.5
Approach LOS	A			A		E
Timer - Assigned Phs	2			4		6
Phs Duration (G+Y+Rc), s	104.0			16.0		104.0
Change Period (Y+Rc), s	7.0			7.0		7.0
Max Green Setting (Gmax), s	75.0			31.0		75.0
Max Q Clear Time (g_c+l1), s	25.8			8.6		58.9
Green Ext Time (p_c), s	23.2			0.4		11.5
Intersection Summary						
HCM 7th Control Delay, s/veh	8.4					
HCM 7th LOS	A					

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	38	0	19	0	61	31	0
Future Vol, veh/h	0	0	0	0	0	38	0	19	0	61	31	0
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	41	0	21	0	66	34	0
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	208	187	34	187	187	21	34	0	0	21	0	0
Stage 1	166	166	-	21	21	-	-	-	-	-	-	-
Stage 2	42	21	-	166	166	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	749	708	1039	774	708	1056	1578	-	-	1595	-	-
Stage 1	836	761	-	998	878	-	-	-	-	-	-	-
Stage 2	972	878	-	836	761	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	697	678	1039	749	678	1056	1578	-	-	1595	-	-
Mov Cap-2 Maneuver	697	678	-	749	678	-	-	-	-	-	-	-
Stage 1	836	729	-	998	878	-	-	-	-	-	-	-
Stage 2	934	878	-	801	729	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0		8.5			0			4.9			
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1578	-	-	-	1056	1595	-	-				
HCM Lane V/C Ratio	-	-	-	-	0.039	0.042	-	-				
HCM Control Delay (s)	0	-	-	0	8.5	7.4	0	-				
HCM Lane LOS	A	-	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0.1	-	-				

Timings

1: Chambers Rd & E. 104th Ave

2027 PROJ AM

Chambers Rd Apartments Traffic Impact Study

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	112	790	100	1040	207	305	200	242	166
Future Volume (vph)	112	790	100	1040	207	305	200	242	166
Turn Type	Prot	NA	Prot	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6		7	4	3	8
Permitted Phases					6	4		8	
Detector Phase	5	2	1	6	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)	12.0	37.0	12.0	37.0	37.0	12.0	34.7	11.7	34.7
Total Split (s)	12.0	52.3	13.0	53.3	53.3	20.0	41.0	13.7	34.7
Total Split (%)	10.0%	43.6%	10.8%	44.4%	44.4%	16.7%	34.2%	11.4%	28.9%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	4.7	4.7	4.7	4.7
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)	7.0	7.0	7.0	7.0	7.0	6.7	6.7	6.7	6.7
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	None	None
Act Effect Green (s)	10.2	51.2	9.5	50.5	50.5	38.3	24.4	24.6	17.2
Actuated g/C Ratio	0.09	0.43	0.08	0.42	0.42	0.32	0.20	0.21	0.14
v/c Ratio	0.45	0.75	0.45	0.87	0.31	1.20	0.49	0.55	0.76
Control Delay (s/veh)	76.5	25.2	58.1	39.7	4.0	153.4	27.1	36.3	44.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	76.5	25.2	58.1	39.7	4.0	153.4	27.1	36.3	44.5
LOS	E	C	E	D	A	F	C	D	D
Approach Delay (s/veh)		30.6		35.6			86.6		41.4
Approach LOS		C		D			F		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 8 (7%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.20

Intersection Signal Delay (s/veh): 44.0

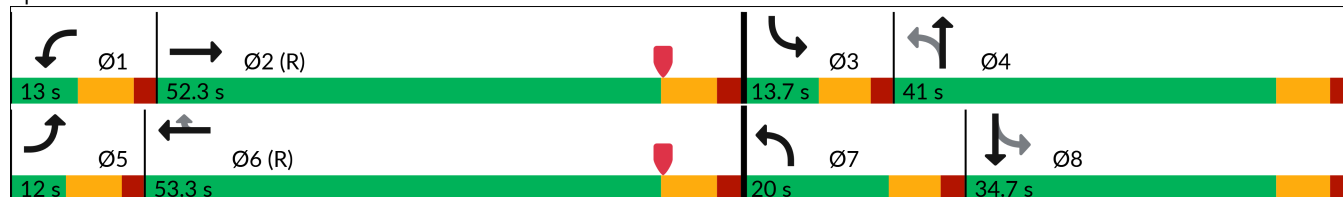
Intersection LOS: D

Intersection Capacity Utilization 84.3%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Chambers Rd & E. 104th Ave



Queues

2027 PROJ AM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	127	1079	120	1253	249	347	390	266	425
v/c Ratio	0.45	0.75	0.45	0.87	0.31	1.20	0.49	0.55	0.76
Control Delay (s/veh)	76.5	25.2	58.1	39.7	4.0	153.4	27.1	36.3	44.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	76.5	25.2	58.1	39.7	4.0	153.4	27.1	36.3	44.5
Queue Length 50th (ft)	54	352	46	451	0	~285	85	79	124
Queue Length 95th (ft)	86	469	71	520	38	#429	122	105	171
Internal Link Dist (ft)		2590		955			548		948
Turn Bay Length (ft)	275		380		350	290		285	
Base Capacity (vph)	282	1443	264	1447	791	288	1055	482	842
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	0.45	0.75	0.45	0.87	0.31	1.20	0.37	0.55	0.50

Intersection Summary

~ 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.

HCM 7th Signalized Intersection Summary

1: Chambers Rd & E. 104th Ave

2027 PROJ AM

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	112	790	159	100	1040	207	305	200	143	242	166	221
Future Volume (veh/h)	112	790	159	100	1040	207	305	200	143	242	166	221
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	127	898	181	120	1253	0	347	227	162	266	182	243
Peak Hour Factor	0.88	0.88	0.88	0.83	0.83	0.83	0.88	0.88	0.88	0.91	0.91	0.91
Percent Heavy Veh, %	5	5	5	5	5	5	2	2	2	2	2	2
Cap, veh/h	141	1245	251	169	1530		286	466	318	569	317	282
Arrive On Green	0.08	0.87	0.87	0.05	0.44	0.00	0.11	0.23	0.23	0.06	0.18	0.18
Sat Flow, veh/h	3374	2877	580	3374	3469	1547	1781	2019	1380	3456	1777	1585
Grp Volume(v), veh/h	127	541	538	120	1253	0	347	199	190	266	182	243
Grp Sat Flow(s),veh/h/ln	1687	1735	1722	1687	1735	1547	1781	1777	1622	1728	1777	1585
Q Serve(g_s), s	4.5	13.4	13.4	4.2	37.9	0.0	13.3	11.6	12.3	7.0	11.3	17.9
Cycle Q Clear(g_c), s	4.5	13.4	13.4	4.2	37.9	0.0	13.3	11.6	12.3	7.0	11.3	17.9
Prop In Lane	1.00		0.34	1.00		1.00	1.00		0.85	1.00		1.00
Lane Grp Cap(c), veh/h	141	751	745	169	1530		286	410	374	569	317	282
V/C Ratio(X)	0.90	0.72	0.72	0.71	0.82		1.21	0.48	0.51	0.47	0.57	0.86
Avail Cap(c_a), veh/h	141	751	745	169	1530		286	508	464	569	415	370
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.84	0.84	0.84	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.8	5.5	5.5	56.1	29.3	0.0	39.3	40.0	40.2	38.5	45.1	47.9
Incr Delay (d2), s/veh	43.0	5.0	5.1	13.1	5.0	0.0	124.3	0.9	1.1	0.6	1.6	14.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	3.2	3.2	2.1	15.8	0.0	11.9	5.1	4.9	3.2	5.0	8.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	97.7	10.5	10.6	69.2	34.4	0.0	163.7	40.9	41.3	39.1	46.8	62.6
LnGrp LOS	F	B	B	E	C		F	D	D	D	D	E
Approach Vol, veh/h	1206			1373			736			691		
Approach Delay, s/veh	19.7			37.4			98.9			49.4		
Approach LOS	B			D			F			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.0	58.9	13.7	34.4	12.0	59.9	20.0	28.1				
Change Period (Y+Rc), s	7.0	7.0	6.7	6.7	7.0	7.0	6.7	6.7				
Max Green Setting (Gmax), s	6.0	45.3	7.0	34.3	5.0	46.3	13.3	28.0				
Max Q Clear Time (g_c+I1), s	6.2	15.4	9.0	14.3	6.5	39.9	15.3	19.9				
Green Ext Time (p_c), s	0.0	7.5	0.0	2.1	0.0	4.0	0.0	1.5				

Intersection Summary

HCM 7th Control Delay, s/veh 45.4

HCM 7th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Chambers Rd & 96th Ave

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Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	88	288	627	155	0	205	2
Future Volume (vph)	88	288	627	155	0	205	2
Turn Type	Prot	NA	NA	Perm	NA	Split	NA
Protected Phases	5	2	6		8	4	4
Permitted Phases				6			
Detector Phase	5	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	59.0	36.0	36.0	23.0	23.0	23.0
Total Split (%)	21.9%	56.2%	34.3%	34.3%	21.9%	21.9%	21.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	Min	None	None	None	None	None
Act Effect Green (s)	10.1	44.0	31.9	31.9	5.7	16.2	16.2
Actuated g/C Ratio	0.14	0.61	0.44	0.44	0.08	0.22	0.22
v/c Ratio	0.45	0.39	0.93	0.23	0.02	0.65	0.52
Control Delay (s/veh)	37.5	9.5	43.5	5.5	0.0	36.8	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.5	9.5	43.5	5.5	0.0	36.8	7.4
LOS	D	A	D	A	A	D	A
Approach Delay (s/veh)		16.1	36.0				20.7
Approach LOS		B	D				C

Intersection Summary

Cycle Length: 105

Actuated Cycle Length: 72.2

Natural Cycle: 115

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.93

Intersection Signal Delay (s/veh): 26.7

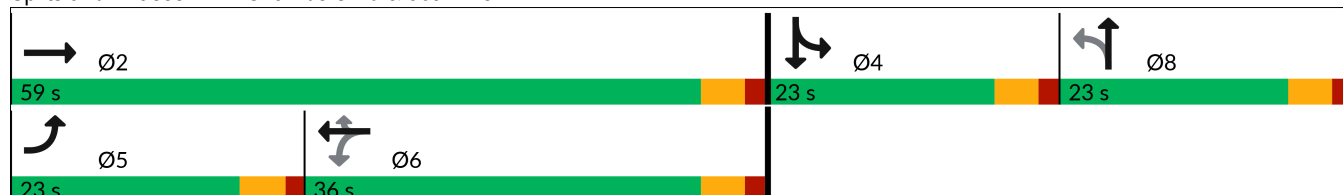
Intersection LOS: C

Intersection Capacity Utilization 78.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: Chambers Rd & 96th Ave





Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	107	352	729	180	8	253	307
v/c Ratio	0.45	0.39	0.93	0.23	0.02	0.65	0.52
Control Delay (s/veh)	37.5	9.5	43.5	5.5	0.0	36.8	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.5	9.5	43.5	5.5	0.0	36.8	7.4
Queue Length 50th (ft)	46	71	317	6	0	103	1
Queue Length 95th (ft)	93	145	#665	47	0	191	44
Internal Link Dist (ft)		1966	2271		176		2572
Turn Bay Length (ft)	70			300			
Base Capacity (vph)	437	1137	785	767	699	445	633
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.31	0.93	0.23	0.01	0.57	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

2: Chambers Rd & 96th Ave

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Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	88	288	1	0	627	155	0	0	3	205	2	247
Future Volume (veh/h)	88	288	1	0	627	155	0	0	3	205	2	247
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1811	1485	1900	1900	1796	1826	1900	1900	1900	1841	1900	1870
Adj Flow Rate, veh/h	107	351	1	0	729	180	0	0	8	253	2	305
Peak Hour Factor	0.82	0.82	0.82	0.86	0.86	0.86	0.38	0.38	0.38	0.81	0.81	0.81
Percent Heavy Veh, %	6	28	0	0	7	5	0	0	0	4	0	2
Cap, veh/h	154	844	2	0	744	641	0	0	16	384	2	351
Arrive On Green	0.09	0.57	0.57	0.00	0.41	0.41	0.00	0.00	0.01	0.22	0.22	0.22
Sat Flow, veh/h	1725	1480	4	0	1796	1547	0	0	1610	1753	11	1601
Grp Volume(v), veh/h	107	0	352	0	729	180	0	0	8	253	0	307
Grp Sat Flow(s),veh/h/ln	1725	0	1484	0	1796	1547	0	0	1610	1753	0	1612
Q Serve(g_s), s	4.5	0.0	10.0	0.0	29.9	5.8	0.0	0.0	0.4	9.9	0.0	13.8
Cycle Q Clear(g_c), s	4.5	0.0	10.0	0.0	29.9	5.8	0.0	0.0	0.4	9.9	0.0	13.8
Prop In Lane	1.00		0.00	0.00		1.00	0.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	154	0	846	0	744	641	0	0	16	384	0	353
V/C Ratio(X)	0.69	0.00	0.42	0.00	0.98	0.28	0.00	0.00	0.49	0.66	0.00	0.87
Avail Cap(c_a), veh/h	415	0	1071	0	744	641	0	0	387	422	0	388
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.1	0.0	9.1	0.0	21.6	14.5	0.0	0.0	36.8	26.7	0.0	28.2
Incr Delay (d2), s/veh	5.5	0.0	0.3	0.0	27.9	0.2	0.0	0.0	20.4	3.3	0.0	17.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	2.9	0.0	17.2	1.9	0.0	0.0	0.2	4.2	0.0	6.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	38.6	0.0	9.4	0.0	49.5	14.8	0.0	0.0	57.3	30.0	0.0	45.8
LnGrp LOS	D		A		D		B		E		C	
Approach Vol, veh/h	459				909				8		560	
Approach Delay, s/veh	16.2				42.7				57.3		38.7	
Approach LOS	B				D				E		D	
Timer - Assigned Phs	2		4		5		6		8			
Phs Duration (G+Y+Rc), s	47.7		21.4		11.7		36.0		5.8			
Change Period (Y+Rc), s	5.0		5.0		5.0		5.0		5.0			
Max Green Setting (Gmax), s	54.0		18.0		18.0		31.0		18.0			
Max Q Clear Time (g_c+I1), s	12.0		15.8		6.5		31.9		2.4			
Green Ext Time (p_c), s	2.5		0.6		0.2		0.0		0.0			
Intersection Summary												
HCM 7th Control Delay, s/veh			35.3									
HCM 7th LOS			D									

Intersection												
Int Delay, s/veh	9.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	73	11	31	62	9	145	13	308	35	126	323	26
Future Vol, veh/h	73	11	31	62	9	145	13	308	35	126	323	26
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	100	-	-	235	-	-	235	-	135
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	79	12	34	67	10	158	14	335	38	137	351	28
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1091	1026	351	1044	1035	354	379	0	0	373	0	0
Stage 1	625	625	-	382	382	-	-	-	-	-	-	-
Stage 2	466	401	-	662	653	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	192	235	692	207	232	690	1179	-	-	1185	-	-
Stage 1	473	477	-	640	613	-	-	-	-	-	-	-
Stage 2	577	601	-	451	464	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	129	205	692	170	203	690	1179	-	-	1185	-	-
Mov Cap-2 Maneuver	129	205	-	170	203	-	-	-	-	-	-	-
Stage 1	467	422	-	632	606	-	-	-	-	-	-	-
Stage 2	433	594	-	369	410	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	49.5			20.7			0.3			2.2		
HCM LOS	E			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1179	-	-	129	427	170	605	1185	-	-		
HCM Lane V/C Ratio	0.012	-	-	0.615	0.107	0.396	0.277	0.116	-	-		
HCM Control Delay (s)	8.1	-	-	69.7	14.4	39.4	13.2	8.4	-	-		
HCM Lane LOS	A	-	-	F	B	E	B	A	-	-		
HCM 95th %tile Q(veh)	0	-	-	3.2	0.4	1.7	1.1	0.4	-	-		

Timings

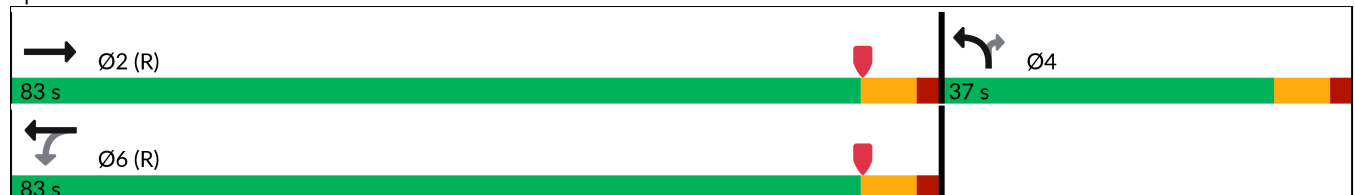
4: Sable Blvd & E. 104th Ave

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Chambers Rd Apartments Traffic Impact Study

					
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations					
Traffic Volume (vph)	1181	46	1458	188	81
Future Volume (vph)	1181	46	1458	188	81
Turn Type	NA	Perm	NA	Prot	Perm
Protected Phases	2		6	4	
Permitted Phases		6			4
Detector Phase	2	6	6	4	4
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	37.0	25.0	25.0	35.0	35.0
Total Split (s)	83.0	83.0	83.0	37.0	37.0
Total Split (%)	69.2%	69.2%	69.2%	30.8%	30.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	86.9	86.9	86.9	19.1	19.1
Actuated g/C Ratio	0.72	0.72	0.72	0.16	0.16
v/c Ratio	0.53	0.22	0.64	0.73	0.28
Control Delay (s/veh)	8.9	5.0	10.6	62.2	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.9	5.0	10.6	62.2	14.8
LOS	A	A	B	E	B
Approach Delay (s/veh)	8.9		10.5	47.9	
Approach LOS	A		B	D	
Intersection Summary					
Cycle Length: 120					
Actuated Cycle Length: 120					
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow					
Natural Cycle: 80					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 0.73					
Intersection Signal Delay (s/veh): 13.2			Intersection LOS: B		
Intersection Capacity Utilization 62.4%			ICU Level of Service B		
Analysis Period (min) 15					

Splits and Phases: 4: Sable Blvd & E. 104th Ave



Queues

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4: Sable Blvd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

					
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1320	50	1585	204	88
v/c Ratio	0.53	0.22	0.64	0.73	0.28
Control Delay (s/veh)	8.9	5.0	10.6	62.2	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.9	5.0	10.6	62.2	14.8
Queue Length 50th (ft)	212	10	468	152	10
Queue Length 95th (ft)	322	m14	m510	221	54
Internal Link Dist (ft)	443		2590	1245	
Turn Bay Length (ft)		300		70	
Base Capacity (vph)	2479	229	2489	442	450
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.53	0.22	0.64	0.46	0.20

Intersection Summary

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

HCM 7th Signalized Intersection Summary

4: Sable Blvd & E. 104th Ave

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Chambers Rd Apartments Traffic Impact Study

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1181	33	46	1458	188	81
Future Volume (veh/h)	1181	33	46	1458	188	81
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1870	1870
Adj Flow Rate, veh/h	1284	36	50	1585	204	88
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	2	2
Cap, veh/h	2580	72	303	2597	240	214
Arrive On Green	0.75	0.75	0.50	0.50	0.13	0.13
Sat Flow, veh/h	3538	97	406	3561	1781	1585
Grp Volume(v), veh/h	646	674	50	1585	204	88
Grp Sat Flow(s),veh/h/ln	1735	1809	406	1735	1781	1585
Q Serve(g_s), s	17.9	17.9	9.6	39.4	13.4	6.1
Cycle Q Clear(g_c), s	17.9	17.9	27.6	39.4	13.4	6.1
Prop In Lane		0.05	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1298	1354	303	2597	240	214
V/C Ratio(X)	0.50	0.50	0.16	0.61	0.85	0.41
Avail Cap(c_a), veh/h	1298	1354	303	2597	445	396
HCM Platoon Ratio	1.00	1.00	0.67	0.67	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.23	0.23	1.00	1.00
Uniform Delay (d), s/veh	6.0	6.0	20.2	17.3	50.7	47.6
Incr Delay (d2), s/veh	1.4	1.3	0.3	0.2	8.2	1.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	6.4	1.0	16.9	6.5	2.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	7.4	7.4	20.5	17.6	58.9	48.8
LnGrp LOS	A	A	C	B	E	D
Approach Vol, veh/h	1320			1635	292	
Approach Delay, s/veh	7.4			17.7	55.8	
Approach LOS	A			B	E	
Timer - Assigned Phs	2		4		6	
Phs Duration (G+Y+Rc), s	96.8		23.2		96.8	
Change Period (Y+Rc), s	7.0		7.0		7.0	
Max Green Setting (Gmax), s	76.0		30.0		76.0	
Max Q Clear Time (g_c+l1), s	19.9		15.4		41.4	
Green Ext Time (p_c), s	13.4		0.8		18.4	
Intersection Summary						
HCM 7th Control Delay, s/veh			16.9			
HCM 7th LOS			B			

Intersection												
Int Delay, s/veh	5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	61	0	26	19	22	10	0
Future Vol, veh/h	0	0	0	0	0	61	0	26	19	22	10	0
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	66	0	28	21	24	11	0
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	87	108	11	97	97	39	11	0	0	49	0	0
Stage 1	59	59	-	39	39	-	-	-	-	-	-	-
Stage 2	28	49	-	59	59	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	899	782	1070	885	793	1033	1608	-	-	1558	-	-
Stage 1	953	846	-	977	863	-	-	-	-	-	-	-
Stage 2	989	854	-	953	846	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	828	770	1070	871	781	1033	1608	-	-	1558	-	-
Mov Cap-2 Maneuver	828	770	-	871	781	-	-	-	-	-	-	-
Stage 1	938	833	-	977	863	-	-	-	-	-	-	-
Stage 2	925	854	-	938	833	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s/v	0		8.72			0			5.05			
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1608	-	-	-	1033	1238	-	-				
HCM Lane V/C Ratio	-	-	-	-	0.064	0.015	-	-				
HCM Control Delay (s/veh)	0	-	-	0	8.7	7.3	0	-				
HCM Lane LOS	A	-	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0	-	-				

Intersection

Int Delay, s/veh 1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	55	28	8	569	450	16
Future Vol, veh/h	55	28	8	569	450	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	175	-	-	135
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	30	9	618	489	17

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1125	489	507
Stage 1	489	-	-
Stage 2	636	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	227	579	1058
Stage 1	616	-	-
Stage 2	527	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	225	579	1058
Mov Cap-2 Maneuver	225	-	-
Stage 1	611	-	-
Stage 2	527	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v21.59		0.12	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1058	-	225	579	-	-
HCM Lane V/C Ratio	0.008	-	0.266	0.053	-	-
HCM Control Delay (s/veh)	8.4	-	26.7	11.6	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0	-	1	0.2	-	-

Intersection

Int Delay, s/veh 4.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	31	8	16	52	4
Future Vol, veh/h	2	31	8	16	52	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	34	9	17	57	4

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	26	0	0 55 17
Stage 1	-	-	- 17 -
Stage 2	-	-	- 38 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1588	-	- 952 1061
Stage 1	-	-	- 1005 -
Stage 2	-	-	- 984 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1588	-	- 951 1061
Mov Cap-2 Maneuver	-	-	- 951 -
Stage 1	-	-	- 1004 -
Stage 2	-	-	- 984 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.44	0	9.01
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	109	-	-	-	958
HCM Lane V/C Ratio	0.001	-	-	-	0.064
HCM Control Delay (s/veh)	7.3	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection												
Int Delay, s/veh	6.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	2	0	0	4	8	0	0	5	26	0	4
Future Vol, veh/h	1	2	0	0	4	8	0	0	5	26	0	4
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	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	1	2	0	0	4	9	0	0	5	28	0	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	13	0	0	2	0	0	9	17	2	13	13	9
Stage 1	-	-	-	-	-	-	4	4	-	9	9	-
Stage 2	-	-	-	-	-	-	4	13	-	4	4	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1605	-	-	1620	-	-	1010	877	1082	1004	881	1073
Stage 1	-	-	-	-	-	-	1018	892	-	1013	888	-
Stage 2	-	-	-	-	-	-	1018	885	-	1018	892	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1605	-	-	1620	-	-	1005	876	1082	998	881	1073
Mov Cap-2 Maneuver	-	-	-	-	-	-	1005	876	-	998	881	-
Stage 1	-	-	-	-	-	-	1017	892	-	1013	888	-
Stage 2	-	-	-	-	-	-	1014	885	-	1012	892	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	2.41			0			8.34			8.69		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	1082	600	-	-	1620	-	-	1007				
HCM Lane V/C Ratio	0.005	0.001	-	-	-	-	-	0.032				
HCM Control Delay (s/veh)	8.3	7.2	0	-	0	-	-	8.7				
HCM Lane LOS	A	A	A	-	A	-	-	A				
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.1				

Timings

1: Chambers Rd & E. 104th Ave

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Chambers Rd Apartments Traffic Impact Study

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	239	874	134	879	277	280	303	335	311
Future Volume (vph)	239	874	134	879	277	280	303	335	311
Turn Type	Prot	NA	Prot	NA	Perm	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6		7	4	3	8
Permitted Phases					6	4		8	
Detector Phase	5	2	1	6	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)	11.0	24.0	11.0	24.5	24.5	11.0	24.0	11.0	24.5
Total Split (s)	17.0	56.5	13.0	52.5	52.5	26.0	33.5	17.0	24.5
Total Split (%)	14.2%	47.1%	10.8%	43.8%	43.8%	21.7%	27.9%	14.2%	20.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
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	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	C-Max	Max	C-Max	C-Max	Max	None	Max	Max
Act Effect Green (s)	12.0	51.5	8.0	47.5	47.5	45.5	28.5	31.5	19.5
Actuated g/C Ratio	0.10	0.43	0.07	0.40	0.40	0.38	0.24	0.26	0.16
v/c Ratio	0.83	0.89	0.78	0.84	0.44	0.83	0.58	0.63	0.81
Control Delay (s/veh)	84.2	31.7	79.1	39.6	4.2	50.3	38.7	32.6	57.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	84.2	31.7	79.1	39.6	4.2	50.3	38.7	32.6	57.1
LOS	F	C	E	D	A	D	D	C	E
Approach Delay (s/veh)		40.9		36.1			43.2		46.2
Approach LOS		D		D			D		D

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay (s/veh): 40.6

Intersection LOS: D

Intersection Capacity Utilization 80.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Chambers Rd & E. 104th Ave



Queues

2027 PROJ PM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	275	1287	174	1142	360	311	489	381	470
v/c Ratio	0.83	0.89	0.78	0.84	0.44	0.83	0.58	0.63	0.81
Control Delay (s/veh)	84.2	31.7	79.1	39.6	4.2	50.3	38.7	32.6	57.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	84.2	31.7	79.1	39.6	4.2	50.3	38.7	32.6	57.1
Queue Length 50th (ft)	117	277	69	415	0	179	156	105	174
Queue Length 95th (ft)	#173	351	#93	400	23	#329	213	140	#232
Internal Link Dist (ft)		2590		955			548		948
Turn Bay Length (ft)	275		380		350	290		285	
Base Capacity (vph)	333	1448	222	1360	826	373	844	603	580
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	0.83	0.89	0.78	0.84	0.44	0.83	0.58	0.63	0.81

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

1: Chambers Rd & E. 104th Ave

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Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	239	874	245	134	879	277	280	303	137	335	311	103
Future Volume (veh/h)	239	874	245	134	879	277	280	303	137	335	311	103
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	275	1005	282	174	1142	0	311	337	152	381	353	117
Peak Hour Factor	0.87	0.87	0.87	0.77	0.77	0.77	0.90	0.90	0.90	0.88	0.88	0.88
Percent Heavy Veh, %	5	5	5	5	5	5	2	2	2	2	2	2
Cap, veh/h	337	1149	321	225	1373		400	569	252	659	428	140
Arrive On Green	0.20	0.86	0.86	0.07	0.40	0.00	0.17	0.24	0.24	0.10	0.16	0.16
Sat Flow, veh/h	3374	2678	748	3374	3469	1547	1781	2396	1060	3456	2633	860
Grp Volume(v), veh/h	275	649	638	174	1142	0	311	248	241	381	236	234
Grp Sat Flow(s),veh/h/ln	1687	1735	1691	1687	1735	1547	1781	1777	1679	1728	1777	1716
Q Serve(g_s), s	9.3	25.3	26.1	6.1	35.6	0.0	16.4	14.9	15.3	11.0	15.4	15.8
Cycle Q Clear(g_c), s	9.3	25.3	26.1	6.1	35.6	0.0	16.4	14.9	15.3	11.0	15.4	15.8
Prop In Lane	1.00		0.44	1.00		1.00	1.00		0.63	1.00		0.50
Lane Grp Cap(c), veh/h	337	744	726	225	1373		400	422	399	659	289	279
V/C Ratio(X)	0.82	0.87	0.88	0.77	0.83		0.78	0.59	0.60	0.58	0.82	0.84
Avail Cap(c_a), veh/h	337	744	726	225	1373		400	422	399	659	289	279
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	0.68	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.9	6.6	6.7	55.1	32.6	0.0	32.1	40.6	40.7	36.9	48.5	48.7
Incr Delay (d2), s/veh	13.7	9.6	10.3	22.4	6.0	0.0	13.8	2.1	2.6	3.7	22.2	24.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	4.7	4.8	3.2	15.2	0.0	8.4	6.6	6.5	4.9	8.5	8.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	60.7	16.2	17.0	77.5	38.6	0.0	45.9	42.7	43.3	40.6	70.7	73.6
LnGrp LOS	E	B	B	E	D		D	D	D	D	E	E
Approach Vol, veh/h	1562			1316			800			851		
Approach Delay, s/veh	24.4			43.8			44.1			58.0		
Approach LOS	C			D			D			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.0	56.5	17.0	33.5	17.0	52.5	26.0	24.5				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	8.0	51.5	12.0	28.5	12.0	47.5	21.0	19.5				
Max Q Clear Time (g_c+I1), s	8.1	28.1	13.0	17.3	11.3	37.6	18.4	17.8				
Green Ext Time (p_c), s	0.0	9.0	0.0	2.1	0.1	5.1	0.3	0.5				

Intersection Summary

HCM 7th Control Delay, s/veh	39.8
HCM 7th LOS	D

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Chambers Rd & 96th Ave

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Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	332	749	569	199	1	197	1
Future Volume (vph)	332	749	569	199	1	197	1
Turn Type	Prot	NA	NA	Perm	NA	Split	NA
Protected Phases	5	2	6		8	4	4
Permitted Phases				6			
Detector Phase	5	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	49.0	26.0	26.0	23.0	23.0	23.0
Total Split (%)	24.2%	51.6%	27.4%	27.4%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	Min	None	None	None	None	None
Act Effect Green (s)	18.2	44.4	21.2	21.2	5.7	13.8	13.8
Actuated g/C Ratio	0.26	0.63	0.30	0.30	0.08	0.20	0.20
v/c Ratio	0.73	0.67	1.25	0.33	0.03	0.66	0.34
Control Delay (s/veh)	36.9	13.8	156.9	5.4	28.5	36.4	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	36.9	13.8	156.9	5.4	28.5	36.4	7.5
LOS	D	B	F	A	C	D	A
Approach Delay (s/veh)		20.9	117.7		28.5		25.1
Approach LOS		C	F		C		C

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 70.2

Natural Cycle: 125

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.25

Intersection Signal Delay (s/veh): 55.7

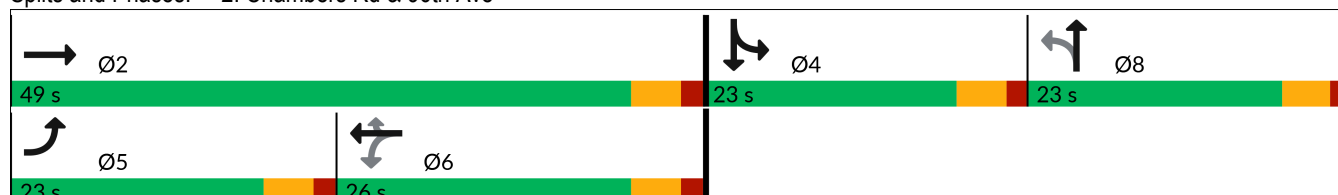
Intersection LOS: E

Intersection Capacity Utilization 99.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Chambers Rd & 96th Ave





Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	342	772	599	209	4	226	145
v/c Ratio	0.73	0.67	1.25	0.33	0.03	0.66	0.34
Control Delay (s/veh)	36.9	13.8	156.9	5.4	28.5	36.4	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	36.9	13.8	156.9	5.4	28.5	36.4	7.5
Queue Length 50th (ft)	129	168	~315	0	1	86	0
Queue Length 95th (ft)	#323	473	#638	51	6	173	42
Internal Link Dist (ft)		1966	2271		176		2572
Turn Bay Length (ft)	70			300			
Base Capacity (vph)	467	1156	478	628	460	453	517
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.67	1.25	0.33	0.01	0.50	0.28

Intersection Summary

~ 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.

HCM 7th Signalized Intersection Summary

2: Chambers Rd & 96th Ave

2027 PROJ PM

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	332	749	0	0	569	199	0	1	1	197	1	125
Future Volume (veh/h)	332	749	0	0	569	199	0	1	1	197	1	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1900	1900	1604	1885	1900	1900	1900	1856	1900	1870
Adj Flow Rate, veh/h	342	772	0	0	599	209	0	2	2	226	1	144
Peak Hour Factor	0.97	0.97	0.97	0.95	0.95	0.95	0.50	0.50	0.50	0.87	0.87	0.87
Percent Heavy Veh, %	0	4	0	0	20	1	0	0	0	3	0	2
Cap, veh/h	395	1114	0	0	502	500	0	5	5	293	2	265
Arrive On Green	0.22	0.61	0.00	0.00	0.31	0.31	0.00	0.01	0.01	0.17	0.17	0.17
Sat Flow, veh/h	1810	1841	0	0	1604	1598	0	872	872	1767	11	1601
Grp Volume(v), veh/h	342	772	0	0	599	209	0	0	4	226	0	145
Grp Sat Flow(s),veh/h/ln	1810	1841	0	0	1604	1598	0	0	1743	1767	0	1612
Q Serve(g_s), s	12.2	19.1	0.0	0.0	21.0	6.9	0.0	0.0	0.2	8.2	0.0	5.5
Cycle Q Clear(g_c), s	12.2	19.1	0.0	0.0	21.0	6.9	0.0	0.0	0.2	8.2	0.0	5.5
Prop In Lane	1.00		0.00	0.00		1.00	0.00		0.50	1.00		0.99
Lane Grp Cap(c), veh/h	395	1114	0	0	502	500	0	0	9	293	0	267
V/C Ratio(X)	0.87	0.69	0.00	0.00	1.19	0.42	0.00	0.00	0.43	0.77	0.00	0.54
Avail Cap(c_a), veh/h	485	1207	0	0	502	500	0	0	468	474	0	432
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.3	9.0	0.0	0.0	23.1	18.2	0.0	0.0	33.3	26.8	0.0	25.7
Incr Delay (d2), s/veh	13.1	1.6	0.0	0.0	105.5	0.6	0.0	0.0	28.2	4.3	0.0	1.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	6.4	0.0	0.0	22.0	2.5	0.0	0.0	0.1	3.5	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	38.4	10.6	0.0	0.0	128.5	18.8	0.0	0.0	61.5	31.1	0.0	27.4
LnGrp LOS	D	B			F	B			E	C		C
Approach Vol, veh/h	1114			808			4			371		
Approach Delay, s/veh	19.1			100.1			61.5			29.6		
Approach LOS	B			F			E			C		
Timer - Assigned Phs	2			4		5	6	8				
Phs Duration (G+Y+Rc), s	45.6			16.1		19.6	26.0	5.4				
Change Period (Y+Rc), s	5.0			5.0		5.0	5.0	5.0				
Max Green Setting (Gmax), s	44.0			18.0		18.0	21.0	18.0				
Max Q Clear Time (g_c+I1), s	21.1			10.2		14.2	23.0	2.2				
Green Ext Time (p_c), s	6.0			0.9		0.4	0.0	0.0				
Intersection Summary												
HCM 7th Control Delay, s/veh				49.4								
HCM 7th LOS				D								

Intersection												
Int Delay, s/veh	11.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	51	5	17	33	8	132	46	430	71	172	343	80
Future Vol, veh/h	51	5	17	33	8	132	46	430	71	172	343	80
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	100	-	-	235	-	-	235	-	135
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	55	5	18	36	9	143	50	467	77	187	373	87
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1429	1391	373	1408	1440	506	460	0	0	544	0	0
Stage 1	747	747	-	606	606	-	-	-	-	-	-	-
Stage 2	682	644	-	802	834	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	112	142	673	116	133	566	1101	-	-	1025	-	-
Stage 1	405	420	-	484	487	-	-	-	-	-	-	-
Stage 2	440	468	-	378	383	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	65	111	673	90	104	566	1101	-	-	1025	-	-
Mov Cap-2 Maneuver	65	111	-	90	104	-	-	-	-	-	-	-
Stage 1	387	344	-	462	465	-	-	-	-	-	-	-
Stage 2	308	447	-	296	313	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	128.8			27			0.7			2.7		
HCM LOS	F			D								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1101	-	-	65	313	90	451	1025	-	-		
HCM Lane V/C Ratio	0.045	-	-	0.853	0.076	0.399	0.337	0.182	-	-		
HCM Control Delay (s)	8.4	-	-	176.8	17.5	69.3	17	9.3	-	-		
HCM Lane LOS	A	-	-	F	C	F	C	A	-	-		
HCM 95th %tile Q(veh)	0.1	-	-	4	0.2	1.6	1.5	0.7	-	-		

Timings

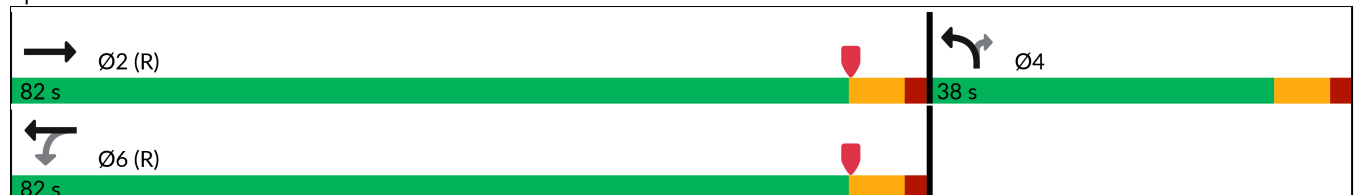
4: Sable Blvd & E. 104th Ave

2027 PROJ PM

Chambers Rd Apartments Traffic Impact Study

					
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations					
Traffic Volume (vph)	1572	99	1341	98	61
Future Volume (vph)	1572	99	1341	98	61
Turn Type	NA	Perm	NA	Prot	Perm
Protected Phases	2		6	4	
Permitted Phases		6			4
Detector Phase	2	6	6	4	4
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	37.0	25.0	25.0	35.0	35.0
Total Split (s)	82.0	82.0	82.0	38.0	38.0
Total Split (%)	68.3%	68.3%	68.3%	31.7%	31.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	93.4	93.4	93.4	12.6	12.6
Actuated g/C Ratio	0.78	0.78	0.78	0.11	0.11
v/c Ratio	0.69	0.83	0.55	0.58	0.35
Control Delay (s/veh)	8.5	59.7	17.2	62.8	35.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.5	59.7	17.2	62.8	35.9
LOS	A	E	B	E	D
Approach Delay (s/veh)	8.5		20.1	52.5	
Approach LOS	A		C	D	
Intersection Summary					
Cycle Length: 120					
Actuated Cycle Length: 120					
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow					
Natural Cycle: 150					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 0.83					
Intersection Signal Delay (s/veh): 15.7			Intersection LOS: B		
Intersection Capacity Utilization 75.2%			ICU Level of Service D		
Analysis Period (min) 15					

Splits and Phases: 4: Sable Blvd & E. 104th Ave

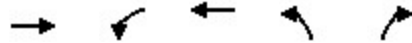


Queues

4: Sable Blvd & E. 104th Ave

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Chambers Rd Apartments Traffic Impact Study



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1824	108	1458	107	66
v/c Ratio	0.69	0.83	0.55	0.58	0.35
Control Delay (s/veh)	8.5	59.7	17.2	62.8	35.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.5	59.7	17.2	62.8	35.9
Queue Length 50th (ft)	293	79	451	80	28
Queue Length 95th (ft)	442	m#97	564	134	70
Internal Link Dist (ft)	443		2590	1245	
Turn Bay Length (ft)		300		70	
Base Capacity (vph)	2654	130	2675	457	428
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.69	0.83	0.55	0.23	0.15

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

HCM 7th Signalized Intersection Summary

4: Sable Blvd & E. 104th Ave

2027 PROJ PM

Chambers Rd Apartments Traffic Impact Study

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↱		↱	↑↑	↱	↱
Traffic Volume (veh/h)	1572	106	99	1341	98	61
Future Volume (veh/h)	1572	106	99	1341	98	61
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1870	1870
Adj Flow Rate, veh/h	1709	115	108	1458	107	66
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	2	2
Cap, veh/h	2654	177	207	2790	141	125
Arrive On Green	0.80	0.80	1.00	1.00	0.08	0.08
Sat Flow, veh/h	3392	220	250	3561	1781	1585
Grp Volume(v), veh/h	891	933	108	1458	107	66
Grp Sat Flow(s),veh/h/ln	1735	1786	250	1735	1781	1585
Q Serve(g_s), s	24.8	25.7	29.9	0.0	7.1	4.8
Cycle Q Clear(g_c), s	24.8	25.7	55.6	0.0	7.1	4.8
Prop In Lane		0.12	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1395	1436	207	2790	141	125
V/C Ratio(X)	0.64	0.65	0.52	0.52	0.76	0.53
Avail Cap(c_a), veh/h	1395	1436	207	2790	460	409
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.43	0.43	1.00	1.00
Uniform Delay (d), s/veh	4.7	4.8	7.4	0.0	54.1	53.1
Incr Delay (d2), s/veh	2.3	2.3	4.0	0.3	8.1	3.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	6.7	1.3	0.1	3.5	2.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	7.0	7.1	11.4	0.3	62.2	56.5
LnGrp LOS	A	A	B	A	E	E
Approach Vol, veh/h	1824			1566	173	
Approach Delay, s/veh	7.0			1.1	60.0	
Approach LOS	A			A	E	
Timer - Assigned Phs	2		4		6	
Phs Duration (G+Y+Rc), s	103.5		16.5		103.5	
Change Period (Y+Rc), s	7.0		7.0		7.0	
Max Green Setting (Gmax), s	75.0		31.0		75.0	
Max Q Clear Time (g_c+l1), s	27.7		9.1		57.6	
Green Ext Time (p_c), s	20.6		0.5		11.6	
Intersection Summary						
HCM 7th Control Delay, s/veh			7.0			
HCM 7th LOS			A			

Intersection												
Int Delay, s/veh	5.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	43	0	19	0	70	31	0
Future Vol, veh/h	0	0	0	0	0	43	0	19	0	70	31	0
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	47	0	21	0	76	34	0
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	207	207	34	207	207	21	34	0	0	21	0	0
Stage 1	186	186	-	21	21	-	-	-	-	-	-	-
Stage 2	21	21	-	186	186	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	751	690	1040	751	690	1057	1578	-	-	1595	-	-
Stage 1	816	746	-	998	878	-	-	-	-	-	-	-
Stage 2	998	878	-	816	746	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	683	657	1040	715	657	1057	1578	-	-	1595	-	-
Mov Cap-2 Maneuver	683	657	-	715	657	-	-	-	-	-	-	-
Stage 1	776	710	-	998	878	-	-	-	-	-	-	-
Stage 2	954	878	-	776	710	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s/v	0		8.56			0			5.11			
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1578	-	-	-	1057	1248	-	-				
HCM Lane V/C Ratio	-	-	-	-	0.044	0.048	-	-				
HCM Control Delay (s/veh)	0	-	-	0	8.6	7.4	0	-				
HCM Lane LOS	A	-	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0.2	-	-				

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	16	29	603	612	58
Future Vol, veh/h	32	16	29	603	612	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	175	-	-	135
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	35	17	32	655	665	63
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1384	665	728	0	-	0
Stage 1	665	-	-	-	-	-
Stage 2	718	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	158	460	875	-	-	-
Stage 1	511	-	-	-	-	-
Stage 2	483	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	153	460	875	-	-	-
Mov Cap-2 Maneuver	153	-	-	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	483	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	28	0.43		0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	875	-	153	460	-	-
HCM Lane V/C Ratio	0.036	-	0.228	0.038	-	-
HCM Control Delay (s/veh)	9.3	-	35.4	13.1	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.8	0.1	-	-

Intersection						
Int Delay, s/veh	2.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	16	32	55	32	3
Future Vol, veh/h	5	16	32	55	32	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	17	35	60	35	3

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	95	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1499	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1499	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	1.76	0	9.12
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	429	-	-	-	911
HCM Lane V/C Ratio	0.004	-	-	-	0.042
HCM Control Delay (s/veh)	7.4	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection												
Int Delay, s/veh	3.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	5	0	5	3	27	0	0	0	16	0	2
Future Vol, veh/h	4	5	0	5	3	27	0	0	0	16	0	2
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	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	4	5	0	5	3	29	0	0	0	17	0	2
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	33	0	0	5	0	0	28	58	5	43	43	18
Stage 1	-	-	-	-	-	-	14	14	-	29	29	-
Stage 2	-	-	-	-	-	-	14	43	-	14	14	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1579	-	-	1616	-	-	981	833	1078	960	849	1061
Stage 1	-	-	-	-	-	-	1006	884	-	988	871	-
Stage 2	-	-	-	-	-	-	1006	859	-	1006	884	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1579	-	-	1616	-	-	973	828	1078	954	844	1061
Mov Cap-2 Maneuver	-	-	-	-	-	-	973	828	-	954	844	-
Stage 1	-	-	-	-	-	-	1003	881	-	985	868	-
Stage 2	-	-	-	-	-	-	1000	856	-	1003	881	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	3.24			1.03			0			8.81		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	-	800	-	-	218	-	-	965				
HCM Lane V/C Ratio	-	0.003	-	-	0.003	-	-	0.02				
HCM Control Delay (s/veh)	0	7.3	0	-	7.2	0	-	8.8				
HCM Lane LOS	A	A	A	-	A	A	-	A				
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.1				

Timings

1: Chambers Rd & E. 104th Ave

2044 BACK AM

Chambers Rd Apartments Traffic Impact Study

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	1120	205	130	1480	295	375	275	160	345	230	315
Future Volume (vph)	160	1120	205	130	1480	295	375	275	160	345	230	315
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		7	4		3	8	5
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	5
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	5.0
Minimum Split (s)	10.5	23.5	23.5	10.5	24.5	24.5	9.5	23.5	23.5	10.5	24.5	10.5
Total Split (s)	25.0	63.2	63.2	15.1	53.3	53.3	17.2	23.7	23.7	18.0	24.5	25.0
Total Split (%)	20.8%	52.7%	52.7%	12.6%	44.4%	44.4%	14.3%	19.8%	19.8%	15.0%	20.4%	20.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	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	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	4.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	12.2	60.9	60.9	9.3	58.0	58.0	29.0	15.3	15.3	28.5	16.1	33.8
Actuated g/C Ratio	0.10	0.51	0.51	0.08	0.48	0.48	0.24	0.13	0.13	0.24	0.13	0.28
v/c Ratio	0.51	0.49	0.25	0.54	0.67	0.35	0.66	0.66	0.49	0.69	0.53	0.70
Control Delay (s/veh)	60.7	13.4	2.5	61.4	26.5	3.5	37.2	53.2	10.6	42.5	52.2	38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	60.7	13.4	2.5	61.4	26.5	3.5	37.2	53.2	10.6	42.5	52.2	38.1
LOS	E	B	A	E	C	A	D	D	B	D	D	D
Approach Delay (s/veh)		17.0			25.3			37.4			43.5	
Approach LOS		B			C			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 44.6 (37%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay (s/veh): 28.0

Intersection LOS: C

Intersection Capacity Utilization 71.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Chambers Rd & E. 104th Ave



Queues

2044 BACK AM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	174	1217	223	141	1609	321	408	299	174	375	250	342
v/c Ratio	0.51	0.49	0.25	0.54	0.67	0.35	0.66	0.66	0.49	0.69	0.53	0.70
Control Delay (s/veh)	60.7	13.4	2.5	61.4	26.5	3.5	37.2	53.2	10.6	42.5	52.2	38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	60.7	13.4	2.5	61.4	26.5	3.5	37.2	53.2	10.6	42.5	52.2	38.1
Queue Length 50th (ft)	55	232	31	54	336	0	116	105	3	121	96	196
Queue Length 95th (ft)	81	251	31	89	456	55	170	157	61	160	136	271
Internal Link Dist (ft)		3380			955			548			948	
Turn Bay Length (ft)	275		250	380		350	290		250	285		250
Base Capacity (vph)	541	2507	890	272	2387	909	620	536	387	542	560	584
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.49	0.25	0.52	0.67	0.35	0.66	0.56	0.45	0.69	0.45	0.59
Intersection Summary												

HCM 7th Signalized Intersection Summary

2044 BACK AM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	1120	205	130	1480	295	375	275	160	345	230	315
Future Volume (veh/h)	160	1120	205	130	1480	295	375	275	160	345	230	315
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	174	1217	223	141	1609	0	408	299	174	375	250	342
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	2	2	2	2	2	2
Cap, veh/h	237	2507	778	196	2446		637	539	240	612	563	362
Arrive On Green	0.07	0.50	0.50	0.06	0.49	0.00	0.11	0.15	0.15	0.10	0.16	0.16
Sat Flow, veh/h	3374	4985	1547	3374	4985	1547	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	174	1217	223	141	1609	0	408	299	174	375	250	342
Grp Sat Flow(s),veh/h/ln	1687	1662	1547	1687	1662	1547	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	6.1	19.3	10.0	4.9	29.1	0.0	11.9	9.4	12.6	10.9	7.6	19.0
Cycle Q Clear(g_c), s	6.1	19.3	10.0	4.9	29.1	0.0	11.9	9.4	12.6	10.9	7.6	19.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	237	2507	778	196	2446		637	539	240	612	563	362
V/C Ratio(X)	0.73	0.49	0.29	0.72	0.66		0.64	0.55	0.72	0.61	0.44	0.94
Avail Cap(c_a), veh/h	548	2507	778	270	2446		637	539	240	612	563	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.84	0.84	0.84	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.7	19.6	17.3	55.6	23.0	0.0	37.8	47.1	48.5	37.7	45.7	45.5
Incr Delay (d2), s/veh	3.7	0.6	0.8	5.7	1.4	0.0	2.2	1.2	10.3	1.8	0.6	33.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	7.1	3.6	2.2	11.0	0.0	5.1	4.2	5.6	4.7	3.4	13.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	58.4	20.2	18.1	61.3	24.4	0.0	39.9	48.4	58.8	39.5	46.3	78.6
LnGrp LOS	E	C	B	E	C		D	D	E	D	D	E
Approach Vol, veh/h	1614			1750			881			967		
Approach Delay, s/veh	24.0			27.4			46.5			55.1		
Approach LOS	C			C			D			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.5	65.8	18.0	23.7	13.9	64.4	17.2	24.5				
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	4.5	5.5				
Max Green Setting (Gmax), s	9.6	57.7	12.5	18.2	19.5	47.8	12.7	19.0				
Max Q Clear Time (g_c+I1), s	6.9	21.3	12.9	14.6	8.1	31.1	13.9	21.0				
Green Ext Time (p_c), s	0.1	11.2	0.0	0.8	0.4	9.9	0.0	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh	34.7
HCM 7th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Chambers Rd & 96th Ave

2044 BACK AM

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	110	410	895	215	0	270	3
Future Volume (vph)	110	410	895	215	0	270	3
Turn Type	Prot	NA	NA	Perm	NA	Split	NA
Protected Phases	5	2	6		8	4	4
Permitted Phases				6			
Detector Phase	5	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	49.0	26.0	26.0	23.0	23.0	23.0
Total Split (%)	24.2%	51.6%	27.4%	27.4%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	Min	None	None	None	None	None
Act Effect Green (s)	10.0	33.7	21.8	21.8	5.7	16.7	16.7
Actuated g/C Ratio	0.16	0.54	0.35	0.35	0.09	0.27	0.27
v/c Ratio	0.44	0.29	0.83	0.34	0.03	0.63	0.50
Control Delay (s/veh)	31.6	8.9	29.6	5.0	0.2	30.2	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	31.6	8.9	29.6	5.0	0.2	30.2	6.3
LOS	C	A	C	A	A	C	A
Approach Delay (s/veh)		13.7	24.9		0.2		17.6
Approach LOS		B	C		A		B

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 62.4

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.83

Intersection Signal Delay (s/veh): 20.2

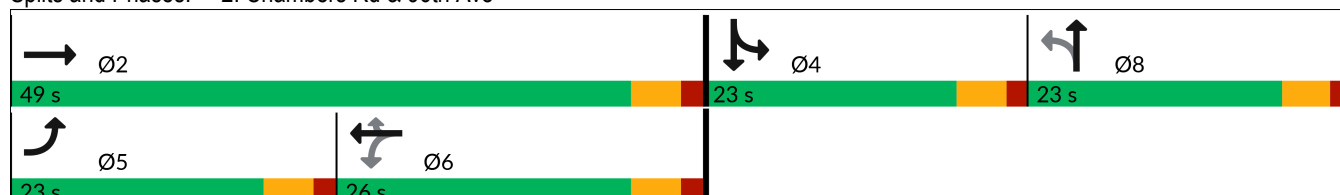
Intersection LOS: C

Intersection Capacity Utilization 70.3%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: Chambers Rd & 96th Ave



Queues

2044 BACK AM

2: Chambers Rd & 96th Ave

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	120	448	973	234	10	293	329
v/c Ratio	0.44	0.29	0.83	0.34	0.03	0.63	0.50
Control Delay (s/veh)	31.6	8.9	29.6	5.0	0.2	30.2	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	31.6	8.9	29.6	5.0	0.2	30.2	6.3
Queue Length 50th (ft)	43	42	183	0	0	97	1
Queue Length 95th (ft)	101	93	#406	52	0	#249	64
Internal Link Dist (ft)		1966	2271		176		2689
Turn Bay Length (ft)	425			300			
Base Capacity (vph)	510	2060	1179	689	673	520	703
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.22	0.83	0.34	0.01	0.56	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

2: Chambers Rd & 96th Ave

2044 BACK AM

Chambers Rd Apartments Traffic Impact Study

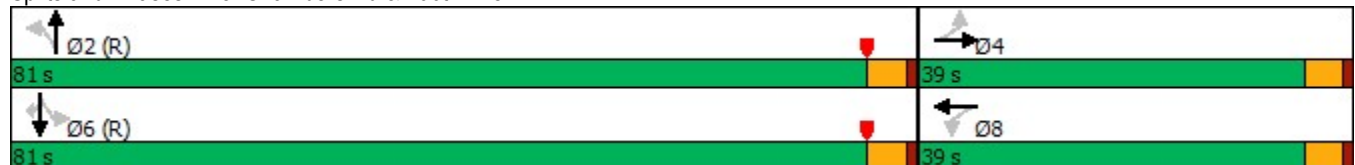
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	410	2	0	895	215	0	0	5	270	3	300
Future Volume (veh/h)	110	410	2	0	895	215	0	0	5	270	3	300
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1811	1485	1900	1900	1796	1826	1900	1900	1900	1841	1900	1870
Adj Flow Rate, veh/h	120	446	2	0	973	234	0	0	10	293	3	326
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.50	0.50	0.50	0.92	0.92	0.92
Percent Heavy Veh, %	6	28	0	0	7	5	0	0	0	4	0	2
Cap, veh/h	176	1456	7	0	1105	501	0	0	21	427	4	389
Arrive On Green	0.10	0.51	0.51	0.00	0.32	0.32	0.00	0.00	0.01	0.24	0.24	0.24
Sat Flow, veh/h	1725	2881	13	0	3503	1547	0	0	1610	1753	15	1598
Grp Volume(v), veh/h	120	218	230	0	973	234	0	0	10	293	0	329
Grp Sat Flow(s),veh/h/ln	1725	1411	1483	0	1706	1547	0	0	1610	1753	0	1612
Q Serve(g_s), s	4.2	5.7	5.7	0.0	17.0	7.6	0.0	0.0	0.4	9.6	0.0	12.2
Cycle Q Clear(g_c), s	4.2	5.7	5.7	0.0	17.0	7.6	0.0	0.0	0.4	9.6	0.0	12.2
Prop In Lane	1.00		0.01	0.00		1.00	0.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	176	713	749	0	1105	501	0	0	21	427	0	393
V/C Ratio(X)	0.68	0.31	0.31	0.00	0.88	0.47	0.00	0.00	0.49	0.69	0.00	0.84
Avail Cap(c_a), veh/h	493	987	1037	0	1139	516	0	0	461	502	0	461
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.2	9.1	9.1	0.0	20.1	17.0	0.0	0.0	30.9	21.6	0.0	22.6
Incr Delay (d2), s/veh	4.5	0.2	0.2	0.0	8.1	0.7	0.0	0.0	16.8	3.1	0.0	11.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	1.5	1.6	0.0	7.3	2.6	0.0	0.0	0.2	3.8	0.0	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	31.8	9.3	9.3	0.0	28.2	17.6	0.0	0.0	47.6	24.8	0.0	33.9
LnGrp LOS	C	A	A		C	B			D	C		C
Approach Vol, veh/h	568			1207			10			622		
Approach Delay, s/veh	14.1			26.2			47.6			29.6		
Approach LOS	B			C			D			C		
Timer - Assigned Phs	2			4		5	6		8			
Phs Duration (G+Y+Rc), s	36.8			20.3		11.4	25.4		5.8			
Change Period (Y+Rc), s	5.0			5.0		5.0	5.0		5.0			
Max Green Setting (Gmax), s	44.0			18.0		18.0	21.0		18.0			
Max Q Clear Time (g_c+I1), s	7.7			14.2		6.2	19.0		2.4			
Green Ext Time (p_c), s	3.0			1.1		0.2	1.4		0.0			
Intersection Summary												
HCM 7th Control Delay, s/veh				24.3								
HCM 7th LOS				C								

Timings 3: Chambers Rd & 100th Ave

Year 2044 Background AM
Chambers Rd Apartments Traffic Impact Study

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	75	15	90	12	15	415	180	415	30
Future Volume (vph)	75	15	90	12	15	415	180	415	30
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4		8		2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	2	2	6	6	6
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)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	39.0	39.0	39.0	39.0	81.0	81.0	81.0	81.0	81.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	67.5%	67.5%	67.5%	67.5%	67.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
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)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	16.8	16.8	16.8	16.8	94.2	94.2	94.2	94.2	94.2
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.78	0.78	0.78	0.78	0.78
v/c Ratio	1.32	0.22	0.52	0.57	0.02	0.35	0.30	0.31	0.03
Control Delay	266.0	18.9	56.2	12.3	4.3	5.2	17.1	15.8	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	266.0	18.9	56.2	12.3	4.3	5.2	17.1	15.8	7.6
LOS	F	B	E	B	A	A	B	B	A
Approach Delay		162.6		25.2		5.2		15.8	
Approach LOS		F		C		A		B	
Intersection Summary									
Cycle Length: 120									
Actuated Cycle Length: 120									
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow									
Natural Cycle: 55									
Control Type: Actuated-Coordinated									
Maximum v/c Ratio: 1.32									
Intersection Signal Delay: 26.7					Intersection LOS: C				
Intersection Capacity Utilization 67.3%					ICU Level of Service C				
Analysis Period (min) 15									

Splits and Phases: 3: Chambers Rd & 100th Ave



Queues
3: Chambers Rd & 100th Ave

Year 2044 Background AM
Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	82	59	98	236	16	505	196	451	33
v/c Ratio	1.32	0.22	0.52	0.57	0.02	0.35	0.30	0.31	0.03
Control Delay	266.0	18.9	56.2	12.3	4.3	5.2	17.1	15.8	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	266.0	18.9	56.2	12.3	4.3	5.2	17.1	15.8	7.6
Queue Length 50th (ft)	~82	11	71	9	2	93	92	246	2
Queue Length 95th (ft)	#162	46	118	77	10	190	201	394	m25
Internal Link Dist (ft)		1101		1411		2689		1855	
Turn Bay Length (ft)	150		100		235		235		135
Base Capacity (vph)	127	507	384	618	701	1441	657	1462	1249
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	0.65	0.12	0.26	0.38	0.02	0.35	0.30	0.31	0.03

Intersection Summary

~ 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.

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

HCM 6th Signalized Intersection Summary

3: Chambers Rd & 100th Ave

Year 2044 Background AM
Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	15	40	90	12	205	15	415	50	180	415	30
Future Volume (veh/h)	75	15	40	90	12	205	15	415	50	180	415	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	82	16	43	98	13	223	16	451	54	196	451	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	163	100	270	323	20	338	629	1149	138	585	1311	1111
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.70	0.70	0.70	0.70	0.70	0.70
Sat Flow, veh/h	1144	448	1205	1344	88	1510	940	1639	196	894	1870	1585
Grp Volume(v), veh/h	82	0	59	98	0	236	16	0	505	196	451	33
Grp Sat Flow(s),veh/h/ln	1144	0	1653	1344	0	1598	940	0	1835	894	1870	1585
Q Serve(g_s), s	8.4	0.0	3.4	7.6	0.0	16.1	0.8	0.0	13.6	13.9	11.4	0.8
Cycle Q Clear(g_c), s	24.6	0.0	3.4	11.0	0.0	16.1	12.2	0.0	13.6	27.5	11.4	0.8
Prop In Lane	1.00		0.73	1.00		0.94	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	163	0	370	323	0	358	629	0	1286	585	1311	1111
V/C Ratio(X)	0.50	0.00	0.16	0.30	0.00	0.66	0.03	0.00	0.39	0.33	0.34	0.03
Avail Cap(c_a), veh/h	235	0	475	408	0	460	629	0	1286	585	1311	1111
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.94	0.00	0.94	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.6	0.0	37.5	41.9	0.0	42.4	9.5	0.0	7.4	13.1	7.1	5.5
Incr Delay (d2), s/veh	2.4	0.0	0.2	0.5	0.0	2.3	0.1	0.0	0.8	1.5	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	1.4	2.6	0.0	6.7	0.2	0.0	5.2	3.0	4.5	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.0	0.0	37.7	42.4	0.0	44.7	9.6	0.0	8.3	14.6	7.8	5.5
LnGrp LOS	E	A	D	D	A	D	A	A	A	B	A	A
Approach Vol, veh/h	141			334			521			680		
Approach Delay, s/veh	48.3			44.0			8.3			9.7		
Approach LOS	D			D			A			A		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	88.6			31.4			88.6			31.4		
Change Period (Y+Rc), s	4.5			4.5			4.5			4.5		
Max Green Setting (Gmax), s	76.5			34.5			76.5			34.5		
Max Q Clear Time (g_c+I1), s	15.6			26.6			29.5			18.1		
Green Ext Time (p_c), s	3.9			0.3			4.8			1.7		
Intersection Summary												
HCM 6th Ctrl Delay	19.3											
HCM 6th LOS	B											

Timings

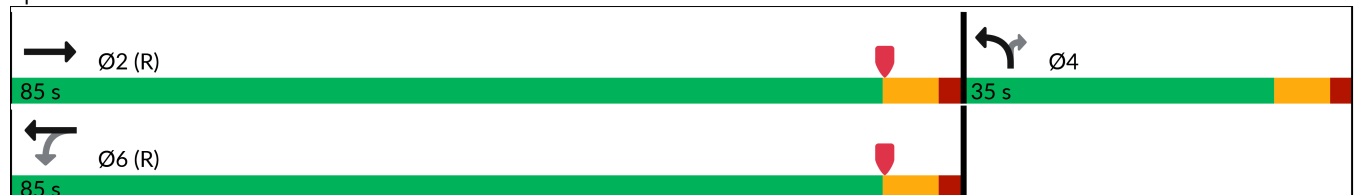
4: Sable Blvd & E. 104th Ave

2044 BACK AM

Chambers Rd Apartments Traffic Impact Study

					
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations					
Traffic Volume (vph)	1660	65	2015	230	110
Future Volume (vph)	1660	65	2015	230	110
Turn Type	NA	Perm	NA	Prot	Perm
Protected Phases	2		6	4	
Permitted Phases		6			4
Detector Phase	2	6	6	4	4
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	37.0	25.0	25.0	35.0	35.0
Total Split (s)	85.0	85.0	85.0	35.0	35.0
Total Split (%)	70.8%	70.8%	70.8%	29.2%	29.2%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Min	C-Max	C-Max	None	None
Act Efect Green (s)	84.2	84.2	84.2	21.8	21.8
Actuated g/C Ratio	0.70	0.70	0.70	0.18	0.18
v/c Ratio	0.53	0.61	0.63	0.78	0.39
Control Delay (s/veh)	9.7	29.1	7.0	62.9	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	9.7	29.1	7.0	62.9	36.5
LOS	A	C	A	E	D
Approach Delay (s/veh)	9.7		7.7	54.3	
Approach LOS	A		A	D	
Intersection Summary					
Cycle Length: 120					
Actuated Cycle Length: 120					
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow					
Natural Cycle: 90					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 0.78					
Intersection Signal Delay (s/veh): 12.4			Intersection LOS: B		
Intersection Capacity Utilization 67.3%			ICU Level of Service C		
Analysis Period (min) 15					

Splits and Phases: 4: Sable Blvd & E. 104th Ave



Queues

2044 BACK AM

4: Sable Blvd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

					
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1842	71	2190	250	120
v/c Ratio	0.53	0.61	0.63	0.78	0.39
Control Delay (s/veh)	9.7	29.1	7.0	62.9	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	9.7	29.1	7.0	62.9	36.5
Queue Length 50th (ft)	225	18	205	186	64
Queue Length 95th (ft)	308	m37	220	263	116
Internal Link Dist (ft)	529		3380	1798	
Turn Bay Length (ft)		300		125	
Base Capacity (vph)	3456	117	3465	413	388
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.53	0.61	0.63	0.61	0.31

Intersection Summary

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

HCM 7th Signalized Intersection Summary

4: Sable Blvd & E. 104th Ave

2044 BACK AM

Chambers Rd Apartments Traffic Impact Study

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	↗
Traffic Volume (veh/h)	1660	35	65	2015	230	110
Future Volume (veh/h)	1660	35	65	2015	230	110
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1870	1870
Adj Flow Rate, veh/h	1804	38	71	2190	250	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	2	2
Cap, veh/h	3630	76	199	3602	286	255
Arrive On Green	0.72	0.72	0.72	0.72	0.16	0.16
Sat Flow, veh/h	5189	106	245	5149	1781	1585
Grp Volume(v), veh/h	1193	649	71	2190	250	120
Grp Sat Flow(s),veh/h/ln	1662	1807	245	1662	1781	1585
Q Serve(g_s), s	18.6	18.7	21.2	26.1	16.4	8.2
Cycle Q Clear(g_c), s	18.6	18.7	39.8	26.1	16.4	8.2
Prop In Lane		0.06	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2401	1306	199	3602	286	255
V/C Ratio(X)	0.50	0.50	0.36	0.61	0.87	0.47
Avail Cap(c_a), veh/h	2401	1306	199	3602	416	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.68	0.68	1.00	1.00
Uniform Delay (d), s/veh	7.2	7.2	15.8	8.2	49.2	45.7
Incr Delay (d2), s/veh	0.7	1.4	3.4	0.5	13.2	1.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	6.9	1.3	8.4	8.4	3.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	7.9	8.6	19.2	8.8	62.3	47.1
LnGrp LOS	A	A	B	A	E	D
Approach Vol, veh/h	1842			2261	370	
Approach Delay, s/veh	8.2			9.1	57.4	
Approach LOS	A			A	E	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		93.7		26.3		93.7
Change Period (Y+Rc), s		7.0		7.0		7.0
Max Green Setting (Gmax), s		78.0		28.0		78.0
Max Q Clear Time (g_c+I1), s		20.7		18.4		41.8
Green Ext Time (p_c), s		23.4		0.9		27.4
Intersection Summary						
HCM 7th Control Delay, s/veh			12.7			
HCM 7th LOS			B			

HCM 6th TWSC
5: Sable Blvd & 102nd Ave

Year 2044 Background AM
Chambers Rd Apartments Traffic Impact Study

Intersection												
Int Delay, s/veh	5.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	55	0	25	0	20	10	0
Future Vol, veh/h	0	0	0	0	0	55	0	25	0	20	10	0
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	60	0	27	0	22	11	0
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	112	82	11	82	82	27	11	0	0	27	0	0
Stage 1	55	55	-	27	27	-	-	-	-	-	-	-
Stage 2	57	27	-	55	55	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	866	808	1070	905	808	1048	1608	-	-	1587	-	-
Stage 1	957	849	-	990	873	-	-	-	-	-	-	-
Stage 2	955	873	-	957	849	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	808	797	1070	895	797	1048	1608	-	-	1587	-	-
Mov Cap-2 Maneuver	808	797	-	895	797	-	-	-	-	-	-	-
Stage 1	957	837	-	990	873	-	-	-	-	-	-	-
Stage 2	901	873	-	944	837	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0		8.6			0			4.9			
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1608	-	-	-	-	1048	1587	-	-			
HCM Lane V/C Ratio	-	-	-	-	-	0.057	0.014	-	-			
HCM Control Delay (s)	0	-	-	0	8.6	7.3	0	-				
HCM Lane LOS	A	-	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0	-	-				

Timings

1: Chambers Rd & E. 104th Ave

2044 BACK PM

Chambers Rd Apartments Traffic Impact Study

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	1240	285	145	1245	395	360	425	170	475	430	145
Future Volume (vph)	340	1240	285	145	1245	395	360	425	170	475	430	145
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		7	4		3	8	5
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	5
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	5.0
Minimum Split (s)	10.5	23.5	23.5	10.5	24.5	24.5	9.5	23.5	23.5	10.5	24.5	10.5
Total Split (s)	21.7	48.3	48.3	15.7	42.3	42.3	31.0	31.9	31.9	24.1	25.0	21.7
Total Split (%)	18.1%	40.3%	40.3%	13.1%	35.3%	35.3%	25.8%	26.6%	26.6%	20.1%	20.8%	18.1%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	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	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	4.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	16.9	48.5	48.5	10.2	41.8	41.8	37.6	21.6	21.6	43.1	25.4	47.8
Actuated g/C Ratio	0.14	0.40	0.40	0.09	0.35	0.35	0.31	0.18	0.18	0.36	0.21	0.40
v/c Ratio	0.79	0.68	0.39	0.56	0.79	0.53	0.58	0.73	0.43	0.76	0.62	0.23
Control Delay (s/veh)	71.9	27.2	3.7	60.6	40.2	5.5	29.4	53.0	9.5	35.0	46.7	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	71.9	27.2	3.7	60.6	40.2	5.5	29.4	53.0	9.5	35.0	46.7	8.0
LOS	E	C	A	E	D	A	C	D	A	D	D	A
Approach Delay (s/veh)		31.7			34.2			36.3			36.1	
Approach LOS		C			C			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay (s/veh): 34.1

Intersection LOS: C

Intersection Capacity Utilization 77.4%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Chambers Rd & E. 104th Ave



Queues

2044 BACK PM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	370	1348	310	158	1353	429	391	462	185	516	467	158
v/c Ratio	0.79	0.68	0.39	0.56	0.79	0.53	0.58	0.73	0.43	0.76	0.62	0.23
Control Delay (s/veh)	71.9	27.2	3.7	60.6	40.2	5.5	29.4	53.0	9.5	35.0	46.7	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	71.9	27.2	3.7	60.6	40.2	5.5	29.4	53.0	9.5	35.0	46.7	8.0
Queue Length 50th (ft)	157	221	0	61	356	0	106	179	3	148	172	20
Queue Length 95th (ft)	#226	302	53	97	#430	77	135	226	63	181	225	64
Internal Link Dist (ft)		3380			955			548			948	
Turn Bay Length (ft)	275		250	380		350	290		250	285		250
Base Capacity (vph)	480	1994	805	298	1719	815	965	778	488	702	748	703
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.68	0.39	0.53	0.79	0.53	0.41	0.59	0.38	0.74	0.62	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

2044 BACK PM

1: Chambers Rd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	340	1240	285	145	1245	395	360	425	170	475	430	145
Future Volume (veh/h)	340	1240	285	145	1245	395	360	425	170	475	430	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	370	1348	310	158	1353	0	391	462	185	516	467	158
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	2	2	2	2	2	2
Cap, veh/h	425	2240	695	213	1928		640	576	257	666	690	508
Arrive On Green	0.13	0.45	0.45	0.06	0.39	0.00	0.12	0.16	0.16	0.14	0.19	0.19
Sat Flow, veh/h	3374	4985	1547	3374	4985	1547	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	370	1348	310	158	1353	0	391	462	185	516	467	158
Grp Sat Flow(s),veh/h/ln	1687	1662	1547	1687	1662	1547	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	12.9	24.5	16.6	5.5	27.4	0.0	11.0	15.0	13.3	14.6	14.6	9.0
Cycle Q Clear(g_c), s	12.9	24.5	16.6	5.5	27.4	0.0	11.0	15.0	13.3	14.6	14.6	9.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	425	2240	695	213	1928		640	576	257	666	690	508
V/C Ratio(X)	0.87	0.60	0.45	0.74	0.70		0.61	0.80	0.72	0.77	0.68	0.31
Avail Cap(c_a), veh/h	455	2240	695	287	1928		995	782	349	712	690	508
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.72	0.72	0.72	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.5	24.9	22.7	55.2	31.0	0.0	35.7	48.4	47.7	35.3	44.8	30.8
Incr Delay (d2), s/veh	12.0	0.9	1.5	6.7	2.2	0.0	0.9	4.3	4.6	5.0	2.6	0.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.0	9.3	6.1	2.5	10.8	0.0	4.6	6.9	5.5	6.4	6.6	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	63.5	25.8	24.2	62.0	33.1	0.0	36.7	52.8	52.3	40.3	47.5	31.1
LnGrp LOS	E	C	C	E	C		D	D	D	D	D	C
Approach Vol, veh/h	2028			1511			1038			1141		
Approach Delay, s/veh	32.4			36.1			46.6			42.0		
Approach LOS	C			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.1	59.4	22.5	24.9	20.6	51.9	18.7	28.8				
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	4.5	5.5				
Max Green Setting (Gmax), s	10.2	42.8	18.6	26.4	16.2	36.8	26.5	19.5				
Max Q Clear Time (g_c+l1), s	7.5	26.5	16.6	17.0	14.9	29.4	13.0	16.6				
Green Ext Time (p_c), s	0.1	9.1	0.4	2.4	0.2	4.7	1.1	1.0				

Intersection Summary

HCM 7th Control Delay, s/veh	37.9
HCM 7th LOS	D

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Chambers Rd & 96th Ave

2044 BACK PM

Chambers Rd Apartments Traffic Impact Study

							
Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	415	1065	810	255	2	265	2
Future Volume (vph)	415	1065	810	255	2	265	2
Turn Type	Prot	NA	NA	Perm	NA	Split	NA
Protected Phases	5	2	6		8	4	4
Permitted Phases				6			
Detector Phase	5	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	49.0	26.0	26.0	23.0	23.0	23.0
Total Split (%)	24.2%	51.6%	27.4%	27.4%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	Min	None	None	None	None	None
Act Effect Green (s)	18.1	44.3	21.1	21.1	5.8	16.6	16.6
Actuated g/C Ratio	0.25	0.61	0.29	0.29	0.08	0.23	0.23
v/c Ratio	0.96	0.52	0.98	0.41	0.06	0.72	0.33
Control Delay (s/veh)	63.9	10.3	54.8	5.5	27.5	38.7	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	63.9	10.3	54.8	5.5	27.5	38.7	7.0
LOS	E	B	D	A	C	D	A
Approach Delay (s/veh)		25.3	43.0		27.5		27.4
Approach LOS		C	D		C		C

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 73

Natural Cycle: 115

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.98

Intersection Signal Delay (s/veh): 32.0

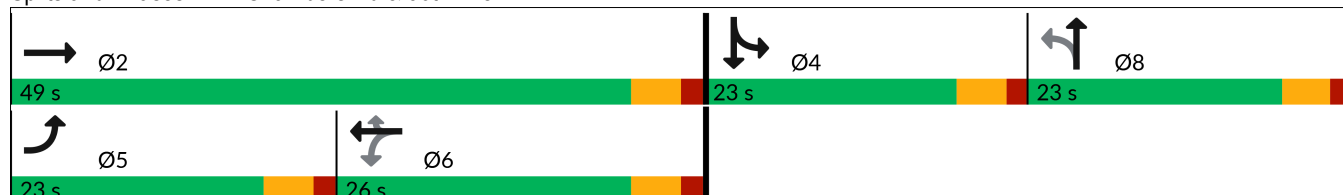
Intersection LOS: C

Intersection Capacity Utilization 85.7%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Chambers Rd & 96th Ave



Queues

2044 BACK PM

2: Chambers Rd & 96th Ave

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	428	1098	853	268	8	288	160
v/c Ratio	0.96	0.52	0.98	0.41	0.06	0.72	0.33
Control Delay (s/veh)	63.9	10.3	54.8	5.5	27.5	38.7	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	63.9	10.3	54.8	5.5	27.5	38.7	7.0
Queue Length 50th (ft)	187	128	195	0	2	115	1
Queue Length 95th (ft)	#433	258	#392	57	8	#260	49
Internal Link Dist (ft)		1966	2271		176		2689
Turn Bay Length (ft)	425			300			
Base Capacity (vph)	447	2104	870	653	442	434	512
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.52	0.98	0.41	0.02	0.66	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

2: Chambers Rd & 96th Ave

2044 BACK PM

Chambers Rd Apartments Traffic Impact Study

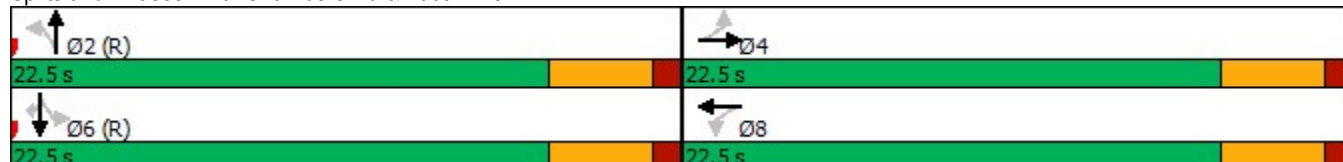
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	415	1065	0	0	810	255	0	2	2	265	2	145
Future Volume (veh/h)	415	1065	0	0	810	255	0	2	2	265	2	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1900	1900	1604	1885	1900	1900	1900	1856	1900	1870
Adj Flow Rate, veh/h	428	1098	0	0	853	268	0	4	4	288	2	158
Peak Hour Factor	0.97	0.97	0.97	0.95	0.95	0.95	0.50	0.50	0.50	0.92	0.92	0.92
Percent Heavy Veh, %	0	4	0	0	20	1	0	0	0	3	0	2
Cap, veh/h	439	2075	0	0	863	452	0	9	9	343	4	309
Arrive On Green	0.24	0.59	0.00	0.00	0.28	0.28	0.00	0.01	0.01	0.19	0.19	0.19
Sat Flow, veh/h	1810	3589	0	0	3127	1598	0	872	872	1767	20	1593
Grp Volume(v), veh/h	428	1098	0	0	853	268	0	0	8	288	0	160
Grp Sat Flow(s),veh/h/ln	1810	1749	0	0	1523	1598	0	0	1743	1767	0	1613
Q Serve(g_s), s	17.4	13.8	0.0	0.0	20.7	10.7	0.0	0.0	0.3	11.6	0.0	6.6
Cycle Q Clear(g_c), s	17.4	13.8	0.0	0.0	20.7	10.7	0.0	0.0	0.3	11.6	0.0	6.6
Prop In Lane	1.00		0.00	0.00		1.00	0.00		0.50	1.00		0.99
Lane Grp Cap(c), veh/h	439	2075	0	0	863	452	0	0	18	343	0	313
V/C Ratio(X)	0.97	0.53	0.00	0.00	0.99	0.59	0.00	0.00	0.45	0.84	0.00	0.51
Avail Cap(c_a), veh/h	439	2075	0	0	863	452	0	0	423	429	0	392
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.8	8.9	0.0	0.0	26.5	22.9	0.0	0.0	36.5	28.8	0.0	26.7
Incr Delay (d2), s/veh	36.2	0.3	0.0	0.0	27.7	2.1	0.0	0.0	16.6	11.5	0.0	1.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	4.5	0.0	0.0	10.4	4.1	0.0	0.0	0.2	5.7	0.0	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	64.0	9.2	0.0	0.0	54.2	25.0	0.0	0.0	53.1	40.2	0.0	28.0
LnGrp LOS	E	A			D	C			D	D		C
Approach Vol, veh/h	1526			1121			8			448		
Approach Delay, s/veh	24.6			47.2			53.1			35.9		
Approach LOS	C			D			D			D		
Timer - Assigned Phs	2			4		5	6		8			
Phs Duration (G+Y+Rc), s	49.0			19.4		23.0	26.0		5.8			
Change Period (Y+Rc), s	5.0			5.0		5.0	5.0		5.0			
Max Green Setting (Gmax), s	44.0			18.0		18.0	21.0		18.0			
Max Q Clear Time (g_c+I1), s	15.8			13.6		19.4	22.7		2.3			
Green Ext Time (p_c), s	9.5			0.8		0.0	0.0		0.0			
Intersection Summary												
HCM 7th Control Delay, s/veh	34.5											
HCM 7th LOS	C											

Timings 3: Chambers Rd & 100th Ave

Year 2044 Background PM
Chambers Rd Apartments Traffic Impact Study

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	55	8	45	11	55	565	245	450	85
Future Volume (vph)	55	8	45	11	55	565	245	450	85
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4		8		2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	2	2	6	6	6
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)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
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)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	8.4	8.4	8.4	8.4	30.5	30.5	30.5	30.5	30.5
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.68	0.68	0.68	0.68	0.68
v/c Ratio	0.30	0.09	0.19	0.51	0.10	0.58	0.70	0.39	0.08
Control Delay	18.3	8.5	15.6	10.4	5.4	9.7	24.6	6.4	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.3	8.5	15.6	10.4	5.4	9.7	24.6	6.4	1.9
LOS	B	A	B	B	A	A	C	A	A
Approach Delay		15.0		11.4		9.3		11.6	
Approach LOS		B		B		A		B	
Intersection Summary									
Cycle Length: 45									
Actuated Cycle Length: 45									
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green									
Natural Cycle: 75									
Control Type: Actuated-Coordinated									
Maximum v/c Ratio: 0.70									
Intersection Signal Delay: 10.8					Intersection LOS: B				
Intersection Capacity Utilization 80.6%					ICU Level of Service D				
Analysis Period (min) 15									

Splits and Phases: 3: Chambers Rd & 100th Ave



Queues
3: Chambers Rd & 100th Ave

Year 2044 Background PM
Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	60	31	49	213	60	723	266	489	92
v/c Ratio	0.30	0.09	0.19	0.51	0.10	0.58	0.70	0.39	0.08
Control Delay	18.3	8.5	15.6	10.4	5.4	9.7	24.6	6.4	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.3	8.5	15.6	10.4	5.4	9.7	24.6	6.4	1.9
Queue Length 50th (ft)	14	2	11	16	5	84	37	49	0
Queue Length 95th (ft)	33	15	27	50	22	#307	#178	137	15
Internal Link Dist (ft)	1101		1411		2689		1855		
Turn Bay Length (ft)	150		100		235		235		135
Base Capacity (vph)	430	679	549	726	577	1239	381	1261	1101
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	0.14	0.05	0.09	0.29	0.10	0.58	0.70	0.39	0.08

Intersection Summary

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

HCM 6th Signalized Intersection Summary

3: Chambers Rd & 100th Ave

Year 2044 Background PM
Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	8	20	45	11	185	55	565	100	245	450	85
Future Volume (veh/h)	55	8	20	45	11	185	55	565	100	245	450	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	60	9	22	49	12	201	60	614	109	266	489	92
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	270	104	253	436	19	325	525	904	161	387	1094	927
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.58	0.58	0.58	0.58	0.58	0.58
Sat Flow, veh/h	1168	482	1177	1378	90	1509	833	1546	275	730	1870	1585
Grp Volume(v), veh/h	60	0	31	49	0	213	60	0	723	266	489	92
Grp Sat Flow(s),veh/h/ln	1168	0	1659	1378	0	1599	833	0	1821	730	1870	1585
Q Serve(g_s), s	2.2	0.0	0.7	1.3	0.0	5.4	2.0	0.0	12.3	14.0	6.6	1.2
Cycle Q Clear(g_c), s	7.6	0.0	0.7	2.0	0.0	5.4	8.6	0.0	12.3	26.3	6.6	1.2
Prop In Lane	1.00		0.71	1.00		0.94	1.00		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	270	0	357	436	0	344	525	0	1065	387	1094	927
V/C Ratio(X)	0.22	0.00	0.09	0.11	0.00	0.62	0.11	0.00	0.68	0.69	0.45	0.10
Avail Cap(c_a), veh/h	486	0	663	691	0	640	525	0	1065	387	1094	927
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.58	0.00	0.58	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.4	0.0	14.1	14.9	0.0	16.0	7.7	0.0	6.4	16.5	5.3	4.1
Incr Delay (d2), s/veh	0.4	0.0	0.1	0.1	0.0	1.8	0.3	0.0	2.0	9.5	1.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.2	0.4	0.0	1.9	0.3	0.0	2.8	3.2	1.6	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.9	0.0	14.2	15.0	0.0	17.8	7.9	0.0	8.5	26.0	6.6	4.3
LnGrp LOS	B	A	B	B	A	B	A	A	A	C	A	A
Approach Vol, veh/h	91			262			783			847		
Approach Delay, s/veh	17.9			17.3			8.4			12.4		
Approach LOS	B			B			A			B		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	30.8			14.2			30.8			14.2		
Change Period (Y+Rc), s	4.5			4.5			4.5			4.5		
Max Green Setting (Gmax), s	18.0			18.0			18.0			18.0		
Max Q Clear Time (g_c+I1), s	14.3			9.6			28.3			7.4		
Green Ext Time (p_c), s	1.7			0.2			0.0			1.0		
Intersection Summary												
HCM 6th Ctrl Delay	11.8											
HCM 6th LOS	B											

Timings

4: Sable Blvd & E. 104th Ave

2044 BACK PM

Chambers Rd Apartments Traffic Impact Study

	→	↖	←	↙	↗
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↖	↑↑↑	↖	↗
Traffic Volume (vph)	2170	135	1870	110	85
Future Volume (vph)	2170	135	1870	110	85
Turn Type	NA	pm+pt	NA	Prot	Perm
Protected Phases	2	1	6	4	
Permitted Phases		6			4
Detector Phase	2	1	6	4	4
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	37.0	9.5	25.0	35.0	35.0
Total Split (s)	71.0	14.0	85.0	35.0	35.0
Total Split (%)	59.2%	11.7%	70.8%	29.2%	29.2%
Yellow Time (s)	5.0	3.5	5.0	5.0	5.0
All-Red Time (s)	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	4.5	7.0	7.0	7.0
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Min	None	C-Max	None	None
Act Effect Green (s)	76.7	95.0	92.5	13.5	13.5
Actuated g/C Ratio	0.64	0.79	0.77	0.11	0.11
v/c Ratio	0.79	0.66	0.53	0.61	0.36
Control Delay (s/veh)	19.5	26.6	13.2	62.9	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.5	26.6	13.2	62.9	13.1
LOS	B	C	B	E	B
Approach Delay (s/veh)	19.5		14.1	41.3	
Approach LOS	B		B	D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Natural Cycle: 105

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay (s/veh): 18.0

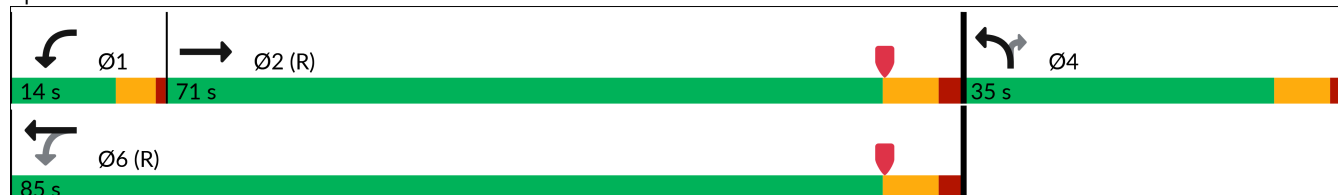
Intersection LOS: B

Intersection Capacity Utilization 73.3%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: Sable Blvd & E. 104th Ave



Queues

2044 BACK PM

4: Sable Blvd & E. 104th Ave

Chambers Rd Apartments Traffic Impact Study

	→	↙	←	↖	↗
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	2473	147	2033	120	92
v/c Ratio	0.79	0.66	0.53	0.61	0.36
Control Delay (s/veh)	19.5	26.6	13.2	62.9	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.5	26.6	13.2	62.9	13.1
Queue Length 50th (ft)	469	36	438	90	0
Queue Length 95th (ft)	686	m73	565	147	47
Internal Link Dist (ft)	529		3380	1798	
Turn Bay Length (ft)		300		125	
Base Capacity (vph)	3137	234	3809	413	439
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.79	0.63	0.53	0.29	0.21

Intersection Summary

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

HCM 7th Signalized Intersection Summary

4: Sable Blvd & E. 104th Ave

2044 BACK PM

Chambers Rd Apartments Traffic Impact Study

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↵	↑↑↑	↵	↵
Traffic Volume (veh/h)	2170	105	135	1870	110	85
Future Volume (veh/h)	2170	105	135	1870	110	85
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1870	1870
Adj Flow Rate, veh/h	2359	114	147	2033	120	92
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	2	2
Cap, veh/h	3495	168	191	3969	155	138
Arrive On Green	0.72	0.72	0.04	0.80	0.09	0.09
Sat Flow, veh/h	5038	234	1739	5149	1781	1585
Grp Volume(v), veh/h	1603	870	147	2033	120	92
Grp Sat Flow(s),veh/h/ln	1662	1784	1739	1662	1781	1585
Q Serve(g_s), s	31.6	32.3	2.5	16.8	7.9	6.7
Cycle Q Clear(g_c), s	31.6	32.3	2.5	16.8	7.9	6.7
Prop In Lane		0.13	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2384	1280	191	3969	155	138
V/C Ratio(X)	0.67	0.68	0.77	0.51	0.77	0.67
Avail Cap(c_a), veh/h	2384	1280	257	3969	416	370
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.65	0.65	1.00	1.00
Uniform Delay (d), s/veh	9.3	9.4	24.8	4.2	53.6	53.1
Incr Delay (d2), s/veh	1.5	2.9	6.4	0.3	7.9	5.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	11.0	3.4	3.8	3.9	2.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	10.8	12.3	31.2	4.5	61.5	58.5
LnGrp LOS	B	B	C	A	E	E
Approach Vol, veh/h	2473			2180	212	
Approach Delay, s/veh	11.3			6.3	60.2	
Approach LOS	B			A	E	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	9.5	93.1		17.5		102.5
Change Period (Y+Rc), s	4.5	7.0		7.0		7.0
Max Green Setting (Gmax), s	9.5	64.0		28.0		78.0
Max Q Clear Time (g_c+I1), s	4.5	34.3		9.9		18.8
Green Ext Time (p_c), s	0.1	22.0		0.6		26.2
Intersection Summary						
HCM 7th Control Delay, s/veh			11.2			
HCM 7th LOS			B			

HCM 6th TWSC
5: Sable Blvd & 102nd Ave

Year 2044 Background PM
Chambers Rd Apartments Traffic Impact Study

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	40	0	20	0	60	30	0
Future Vol, veh/h	0	0	0	0	0	40	0	20	0	60	30	0
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	43	0	22	0	65	33	0
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	207	185	33	185	185	22	33	0	0	22	0	0
Stage 1	163	163	-	22	22	-	-	-	-	-	-	-
Stage 2	44	22	-	163	163	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	751	709	1041	776	709	1055	1579	-	-	1593	-	-
Stage 1	839	763	-	996	877	-	-	-	-	-	-	-
Stage 2	970	877	-	839	763	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	697	679	1041	751	679	1055	1579	-	-	1593	-	-
Mov Cap-2 Maneuver	697	679	-	751	679	-	-	-	-	-	-	-
Stage 1	839	731	-	996	877	-	-	-	-	-	-	-
Stage 2	930	877	-	804	731	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	0		8.6		0		4.9					
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1579	-	-	-	-	1055	1593	-	-			
HCM Lane V/C Ratio	-	-	-	-	-	0.041	0.041	-	-			
HCM Control Delay (s)	0	-	-	0	8.6	7.4	0	-				
HCM Lane LOS	A	-	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0.1	-	-				

Timings

1: Chambers Rd & E. 104th Ave

2044 PROJECT AM

Chambers Rd Apartments Traffic Impact Study

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	1120	214	136	1480	295	405	279	178	345	231	315
Future Volume (vph)	160	1120	214	136	1480	295	405	279	178	345	231	315
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		7	4		3	8	5
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	5
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	5.0
Minimum Split (s)	12.0	25.0	25.0	12.0	25.0	25.0	11.0	25.0	25.0	12.0	25.0	12.0
Total Split (s)	17.0	50.0	50.0	16.0	49.0	49.0	29.0	36.0	36.0	18.0	25.0	17.0
Total Split (%)	14.2%	41.7%	41.7%	13.3%	40.8%	40.8%	24.2%	30.0%	30.0%	15.0%	20.8%	14.2%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	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	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None
Act Effect Green (s)	10.9	51.1	51.1	10.0	50.2	50.2	37.5	19.7	19.7	25.1	13.9	31.8
Actuated g/C Ratio	0.09	0.43	0.43	0.08	0.42	0.42	0.31	0.16	0.16	0.21	0.12	0.27
v/c Ratio	0.58	0.58	0.30	0.53	0.78	0.39	0.60	0.52	0.47	0.67	0.61	0.64
Control Delay (s/veh)	72.2	20.2	1.7	59.9	34.5	4.4	37.6	51.8	15.1	38.9	56.8	26.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	72.2	20.2	1.7	59.9	34.5	4.4	37.6	51.8	15.1	38.9	56.8	26.2
LOS	E	C	A	E	C	A	D	D	B	D	E	C
Approach Delay (s/veh)		23.1			31.7			37.6			39.0	
Approach LOS		C			C			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay (s/veh): 31.5

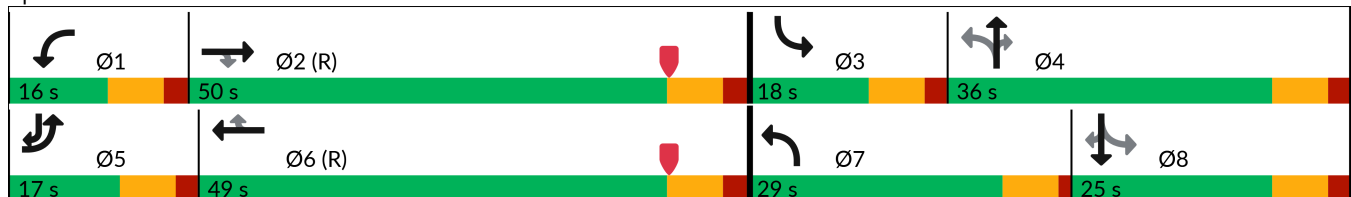
Intersection LOS: C

Intersection Capacity Utilization 76.3%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Chambers Rd & E. 104th Ave



Queues

1: Chambers Rd & E. 104th Ave

2044 PROJECT AM

Chambers Rd Apartments Traffic Impact Study

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	174	1217	233	148	1609	321	440	303	193	375	251	342
v/c Ratio	0.58	0.58	0.30	0.53	0.78	0.39	0.60	0.52	0.47	0.67	0.61	0.64
Control Delay (s/veh)	72.2	20.2	1.7	59.9	34.5	4.4	37.6	51.8	15.1	38.9	56.8	26.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	72.2	20.2	1.7	59.9	34.5	4.4	37.6	51.8	15.1	38.9	56.8	26.2
Queue Length 50th (ft)	74	131	0	57	391	0	142	116	9	114	98	127
Queue Length 95th (ft)	113	166	19	92	#536	61	176	m153	m79	141	139	223
Internal Link Dist (ft)		2580			955			548			948	
Turn Bay Length (ft)	275		300	380		350	290		250	285		250
Base Capacity (vph)	311	2103	788	285	2067	830	838	855	517	557	530	537
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.58	0.30	0.52	0.78	0.39	0.53	0.35	0.37	0.67	0.47	0.64

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

HCM 7th Signalized Intersection Summary

1: Chambers Rd & E. 104th Ave

2044 PROJECT AM

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	160	1120	214	136	1480	295	405	279	178	345	231	315
Future Volume (veh/h)	160	1120	214	136	1480	295	405	279	178	345	231	315
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	174	1217	233	148	1609	0	440	303	193	375	251	342
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	2	2	2	2	2	2
Cap, veh/h	226	2167	673	202	2131		707	641	286	619	533	344
Arrive On Green	0.13	0.87	0.87	0.06	0.43	0.00	0.13	0.18	0.18	0.09	0.15	0.15
Sat Flow, veh/h	3374	4985	1547	3374	4985	1547	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	174	1217	233	148	1609	0	440	303	193	375	251	342
Grp Sat Flow(s),veh/h/ln	1687	1662	1547	1687	1662	1547	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	6.0	7.5	3.4	5.2	32.7	0.0	12.6	9.2	13.6	11.0	7.8	18.0
Cycle Q Clear(g_c), s	6.0	7.5	3.4	5.2	32.7	0.0	12.6	9.2	13.6	11.0	7.8	18.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	226	2167	673	202	2131		707	641	286	619	533	344
V/C Ratio(X)	0.77	0.56	0.35	0.73	0.76		0.62	0.47	0.68	0.61	0.47	0.99
Avail Cap(c_a), veh/h	281	2167	673	253	2131		919	859	383	619	533	344
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.83	0.83	0.83	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.1	4.9	4.7	55.5	29.0	0.0	35.9	44.1	45.9	38.9	46.6	46.9
Incr Delay (d2), s/veh	8.2	0.9	1.2	8.0	2.5	0.0	0.9	0.5	2.8	1.7	0.6	46.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	1.7	1.1	2.4	12.8	0.0	5.3	4.0	5.5	4.8	3.4	14.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	59.2	5.8	5.8	63.4	31.6	0.0	36.9	44.6	48.7	40.6	47.3	93.7
LnGrp LOS	E	A	A	E	C		D	D	D	D	D	F
Approach Vol, veh/h	1624			1757			936			968		
Approach Delay, s/veh	11.5			34.3			41.8			61.1		
Approach LOS	B			C			D			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.2	59.2	18.0	28.6	15.0	58.3	21.6	25.0				
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	6.0	7.0				
Max Green Setting (Gmax), s	9.0	43.0	11.0	29.0	10.0	42.0	23.0	18.0				
Max Q Clear Time (g_c+I1), s	7.2	9.5	13.0	15.6	8.0	34.7	14.6	20.0				
Green Ext Time (p_c), s	0.1	11.0	0.0	2.0	0.1	5.2	1.0	0.0				

Intersection Summary

HCM 7th Control Delay, s/veh 33.5

HCM 7th LOS C

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Chambers Rd & 96th Ave

2044 PROJECT AM
Chambers Rd Apartments Traffic Impact Study

							
Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	115	410	895	218	0	279	3
Future Volume (vph)	115	410	895	218	0	279	3
Turn Type	Prot	NA	NA	Perm	NA	Split	NA
Protected Phases	5	2	6		8	4	4
Permitted Phases				6			
Detector Phase	5	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	49.0	26.0	26.0	23.0	23.0	23.0
Total Split (%)	24.2%	51.6%	27.4%	27.4%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	Min	None	None	None	None	None
Act Effect Green (s)	10.2	33.7	21.7	21.7	5.7	17.5	17.5
Actuated g/C Ratio	0.16	0.53	0.34	0.34	0.09	0.28	0.28
v/c Ratio	0.46	0.30	0.84	0.35	0.03	0.63	0.51
Control Delay (s/veh)	32.1	9.1	30.8	5.0	0.2	30.3	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.1	9.1	30.8	5.0	0.2	30.3	6.2
LOS	C	A	C	A	A	C	A
Approach Delay (s/veh)		14.1	25.8		0.2		17.4
Approach LOS		B	C		A		B

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 63.2

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.84

Intersection Signal Delay (s/veh): 20.7

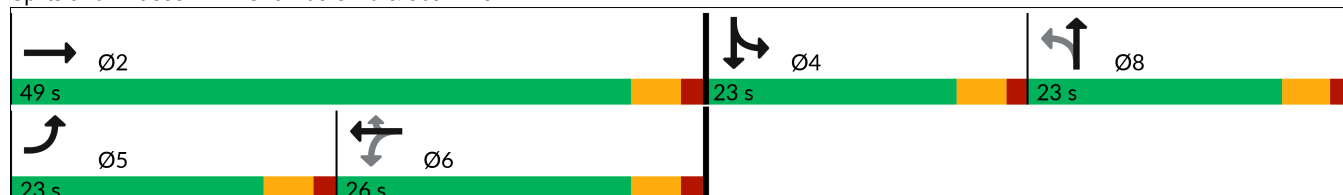
Intersection LOS: C

Intersection Capacity Utilization 70.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: Chambers Rd & 96th Ave



Queues

2: Chambers Rd & 96th Ave

2044 PROJECT AM

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	125	448	973	237	10	303	348
v/c Ratio	0.46	0.30	0.84	0.35	0.03	0.63	0.51
Control Delay (s/veh)	32.1	9.1	30.8	5.0	0.2	30.3	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	32.1	9.1	30.8	5.0	0.2	30.3	6.2
Queue Length 50th (ft)	45	42	184	0	0	102	1
Queue Length 95th (ft)	105	93	#408	51	0	#262	66
Internal Link Dist (ft)		1966	2271		176		2584
Turn Bay Length (ft)	425			300		175	
Base Capacity (vph)	501	2030	1159	683	664	511	710
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.22	0.84	0.35	0.02	0.59	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

2: Chambers Rd & 96th Ave

2044 PROJECT AM
Chambers Rd Apartments Traffic Impact Study

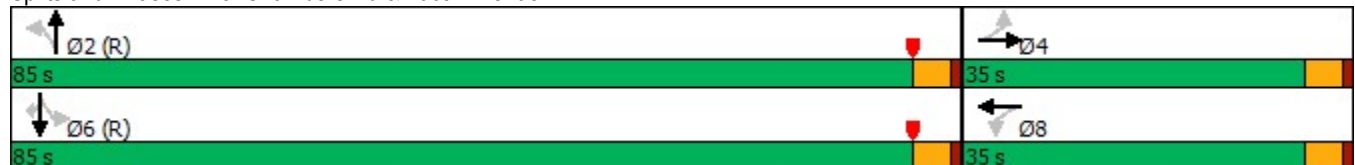
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	410	2	0	895	218	0	0	5	279	3	317
Future Volume (veh/h)	115	410	2	0	895	218	0	0	5	279	3	317
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1811	1485	1900	1900	1796	1826	1900	1900	1900	1841	1900	1870
Adj Flow Rate, veh/h	125	446	2	0	973	237	0	0	10	303	3	345
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.50	0.50	0.50	0.92	0.92	0.92
Percent Heavy Veh, %	6	28	0	0	7	5	0	0	0	4	0	2
Cap, veh/h	180	1447	6	0	1091	495	0	0	20	441	3	402
Arrive On Green	0.10	0.50	0.50	0.00	0.32	0.32	0.00	0.00	0.01	0.25	0.25	0.25
Sat Flow, veh/h	1725	2881	13	0	3503	1547	0	0	1610	1753	14	1598
Grp Volume(v), veh/h	125	218	230	0	973	237	0	0	10	303	0	348
Grp Sat Flow(s),veh/h/ln	1725	1411	1483	0	1706	1547	0	0	1610	1753	0	1612
Q Serve(g_s), s	4.5	5.9	5.9	0.0	17.4	7.9	0.0	0.0	0.4	10.0	0.0	13.2
Cycle Q Clear(g_c), s	4.5	5.9	5.9	0.0	17.4	7.9	0.0	0.0	0.4	10.0	0.0	13.2
Prop In Lane	1.00		0.01	0.00		1.00	0.00		1.00	1.00		0.99
Lane Grp Cap(c), veh/h	180	708	745	0	1091	495	0	0	20	441	0	405
V/C Ratio(X)	0.69	0.31	0.31	0.00	0.89	0.48	0.00	0.00	0.49	0.69	0.00	0.86
Avail Cap(c_a), veh/h	484	967	1017	0	1117	506	0	0	452	492	0	452
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.7	9.4	9.4	0.0	20.8	17.5	0.0	0.0	31.5	21.7	0.0	22.9
Incr Delay (d2), s/veh	4.7	0.2	0.2	0.0	9.1	0.7	0.0	0.0	16.9	3.5	0.0	14.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.6	1.7	0.0	7.7	2.7	0.0	0.0	0.2	4.1	0.0	6.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	32.5	9.7	9.6	0.0	29.9	18.3	0.0	0.0	48.3	25.2	0.0	37.0
LnGrp LOS	C	A	A		C	B			D	C		D
Approach Vol, veh/h	573			1210			10			651		
Approach Delay, s/veh	14.6			27.6			48.3			31.5		
Approach LOS	B			C			D			C		
Timer - Assigned Phs	2			4		5	6		8			
Phs Duration (G+Y+Rc), s	37.2			21.1		11.7	25.5		5.8			
Change Period (Y+Rc), s	5.0			5.0		5.0	5.0		5.0			
Max Green Setting (Gmax), s	44.0			18.0		18.0	21.0		18.0			
Max Q Clear Time (g_c+I1), s	7.9			15.2		6.5	19.4		2.4			
Green Ext Time (p_c), s	3.0			0.9		0.2	1.1		0.0			
Intersection Summary												
HCM 7th Control Delay, s/veh				25.7								
HCM 7th LOS				C								

Timings 3: Chambers Rd & 100th Avenue

Year 2044 w/Project AM
Chambers Rd Apartments Traffic Impact Study

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	75	15	90	12	15	423	180	441	30
Future Volume (vph)	75	15	90	12	15	423	180	441	30
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4		8		2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	2	2	6	6	6
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)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	35.0	35.0	35.0	35.0	85.0	85.0	85.0	85.0	85.0
Total Split (%)	29.2%	29.2%	29.2%	29.2%	70.8%	70.8%	70.8%	70.8%	70.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
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)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	17.5	17.5	17.5	17.5	93.5	93.5	93.5	93.5	93.5
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.78	0.78	0.78	0.78	0.78
v/c Ratio	1.32	0.21	0.50	0.56	0.02	0.36	0.31	0.33	0.03
Control Delay	264.1	18.4	54.1	11.8	4.6	5.6	5.0	4.4	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	264.1	18.4	54.1	11.8	4.6	5.6	5.0	4.4	0.8
LOS	F	B	D	B	A	A	A	A	A
Approach Delay		161.3		24.2		5.6		4.4	
Approach LOS		F		C		A		A	
Intersection Summary									
Cycle Length: 120									
Actuated Cycle Length: 120									
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow									
Natural Cycle: 55									
Control Type: Actuated-Coordinated									
Maximum v/c Ratio: 1.32									
Intersection Signal Delay: 21.5					Intersection LOS: C				
Intersection Capacity Utilization 67.7%					ICU Level of Service C				
Analysis Period (min) 15									

Splits and Phases: 3: Chambers Rd & 100th Avenue



Queues
3: Chambers Rd & 100th Avenue

Year 2044 w/Project AM
Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	82	59	98	236	16	514	196	479	33
v/c Ratio	1.32	0.21	0.50	0.56	0.02	0.36	0.31	0.33	0.03
Control Delay	264.1	18.4	54.1	11.8	4.6	5.6	5.0	4.4	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	264.1	18.4	54.1	11.8	4.6	5.6	5.0	4.4	0.8
Queue Length 50th (ft)	~82	11	71	9	2	100	30	75	0
Queue Length 95th (ft)	#161	46	116	76	10	203	57	116	m4
Internal Link Dist (ft)		625		478		2584		1270	
Turn Bay Length (ft)	150		100		235		235		135
Base Capacity (vph)	108	453	340	572	671	1430	642	1451	1240
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	0.76	0.13	0.29	0.41	0.02	0.36	0.31	0.33	0.03

Intersection Summary

~ 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.

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

HCM 6th Signalized Intersection Summary

3: Chambers Rd & 100th Avenue

Year 2044 w/Project AM
Chambers Rd Apartments Traffic Impact Study

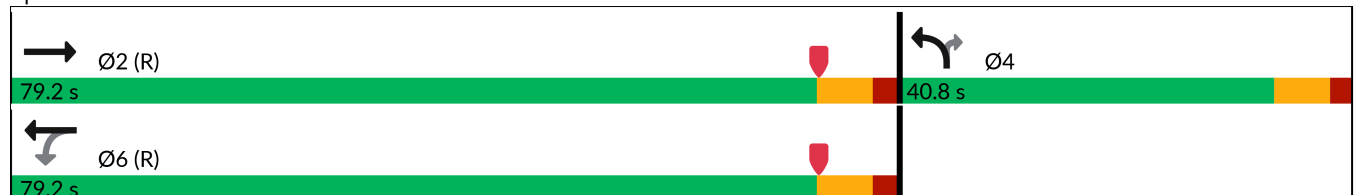
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	15	40	90	12	205	15	423	50	180	441	30
Future Volume (veh/h)	75	15	40	90	12	205	15	423	50	180	441	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	82	16	43	98	13	223	16	460	54	196	479	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	161	100	269	321	20	337	592	1153	135	580	1313	1113
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.70	0.70	0.70	0.70	0.70	0.70
Sat Flow, veh/h	1144	448	1205	1344	88	1510	888	1643	193	887	1870	1585
Grp Volume(v), veh/h	82	0	59	98	0	236	16	0	514	196	479	33
Grp Sat Flow(s),veh/h/ln	1144	0	1653	1344	0	1598	888	0	1836	887	1870	1585
Q Serve(g_s), s	8.4	0.0	3.4	7.6	0.0	16.1	0.9	0.0	13.9	14.1	12.3	0.8
Cycle Q Clear(g_c), s	24.6	0.0	3.4	11.1	0.0	16.1	13.2	0.0	13.9	28.0	12.3	0.8
Prop In Lane	1.00		0.73	1.00		0.94	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	161	0	369	321	0	357	592	0	1288	580	1313	1113
V/C Ratio(X)	0.51	0.00	0.16	0.31	0.00	0.66	0.03	0.00	0.40	0.34	0.36	0.03
Avail Cap(c_a), veh/h	197	0	420	363	0	406	592	0	1288	580	1313	1113
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.94	0.00	0.94	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.7	0.0	37.6	42.0	0.0	42.5	9.8	0.0	7.4	13.2	7.2	5.4
Incr Delay (d2), s/veh	2.5	0.0	0.2	0.5	0.0	3.3	0.1	0.0	0.9	1.6	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.0	1.4	2.6	0.0	6.7	0.2	0.0	5.0	2.9	4.5	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.2	0.0	37.8	42.5	0.0	45.8	9.9	0.0	8.3	14.8	8.0	5.5
LnGrp LOS	E	A	D	D	A	D	A	A	A	B	A	A
Approach Vol, veh/h	141			334			530			708		
Approach Delay, s/veh	48.5			44.8			8.3			9.7		
Approach LOS	D			D			A			A		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	88.7			31.3			88.7			31.3		
Change Period (Y+Rc), s	4.5			4.5			4.5			4.5		
Max Green Setting (Gmax), s	80.5			30.5			80.5			30.5		
Max Q Clear Time (g_c+I1), s	15.9			26.6			30.0			18.1		
Green Ext Time (p_c), s	3.6			0.2			4.6			1.4		
Intersection Summary												
HCM 6th Ctrl Delay	19.3											
HCM 6th LOS	B											

Timings 4: Sable Blvd & E. 104th Ave

2044 PROJECT AM
Chambers Rd Apartments Traffic Impact Study

					
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations					
Traffic Volume (vph)	1669	65	2045	238	110
Future Volume (vph)	1669	65	2045	238	110
Turn Type	NA	Perm	NA	Prot	Perm
Protected Phases	2		6	4	
Permitted Phases		6			4
Detector Phase	2	6	6	4	4
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	37.0	22.5	22.5	40.5	40.5
Total Split (s)	79.2	79.2	79.2	40.8	40.8
Total Split (%)	66.0%	66.0%	66.0%	34.0%	34.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	C-Max	C-Max	C-Max	None	None
Act Efect Green (s)	83.1	83.1	83.1	22.9	22.9
Actuated g/C Ratio	0.69	0.69	0.69	0.19	0.19
v/c Ratio	0.54	0.63	0.65	0.77	0.38
Control Delay (s/veh)	10.4	51.0	24.2	60.8	37.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	10.4	51.0	24.2	60.8	37.9
LOS	B	D	C	E	D
Approach Delay (s/veh)	10.4		25.0	53.6	
Approach LOS	B		C	D	
Intersection Summary					
Cycle Length: 120					
Actuated Cycle Length: 120					
Offset: 117.5 (98%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow					
Natural Cycle: 90					
Control Type: Actuated-Coordinated					
Maximum v/c Ratio: 0.77					
Intersection Signal Delay (s/veh): 21.4			Intersection LOS: C		
Intersection Capacity Utilization 67.9%			ICU Level of Service C		
Analysis Period (min) 15					

Splits and Phases: 4: Sable Blvd & E. 104th Ave



Queues

4: Sable Blvd & E. 104th Ave

2044 PROJECT AM

Chambers Rd Apartments Traffic Impact Study

					
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1855	71	2223	259	120
v/c Ratio	0.54	0.63	0.65	0.77	0.38
Control Delay (s/veh)	10.4	51.0	24.2	60.8	37.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	10.4	51.0	24.2	60.8	37.9
Queue Length 50th (ft)	233	45	512	192	69
Queue Length 95th (ft)	332	m84	681	267	118
Internal Link Dist (ft)	374		2580	1227	
Turn Bay Length (ft)		300		125	
Base Capacity (vph)	3413	112	3422	498	458
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.54	0.63	0.65	0.52	0.26

Intersection Summary

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

HCM 7th Signalized Intersection Summary

4: Sable Blvd & E. 104th Ave

2044 PROJECT AM
Chambers Rd Apartments Traffic Impact Study

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑↱		↙	↑↑↑	↙	↗
Traffic Volume (veh/h)	1669	38	65	2045	238	110
Future Volume (veh/h)	1669	38	65	2045	238	110
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1870	1870
Adj Flow Rate, veh/h	1814	41	71	2223	259	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	2	2
Cap, veh/h	3593	81	195	3571	297	265
Arrive On Green	0.72	0.72	0.72	0.72	0.17	0.17
Sat Flow, veh/h	5180	113	242	5149	1781	1585
Grp Volume(v), veh/h	1202	653	71	2223	259	120
Grp Sat Flow(s),veh/h/ln	1662	1806	242	1662	1781	1585
Q Serve(g_s), s	19.3	19.3	22.1	27.4	17.0	8.2
Cycle Q Clear(g_c), s	19.3	19.3	41.4	27.4	17.0	8.2
Prop In Lane		0.06	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2381	1293	195	3571	297	265
V/C Ratio(X)	0.50	0.51	0.36	0.62	0.87	0.45
Avail Cap(c_a), veh/h	2381	1293	195	3571	502	446
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.61	0.61	1.00	1.00
Uniform Delay (d), s/veh	7.6	7.6	16.8	8.7	48.7	45.0
Incr Delay (d2), s/veh	0.8	1.4	3.2	0.5	8.6	1.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	6.6	1.3	8.1	8.2	3.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	8.3	9.0	20.0	9.2	57.3	46.3
LnGrp LOS	A	A	B	A	E	D
Approach Vol, veh/h	1855			2294		379
Approach Delay, s/veh	8.6			9.6		53.8
Approach LOS	A			A		D
Timer - Assigned Phs	2		4		6	
Phs Duration (G+Y+Rc), s	93.0		27.0		93.0	
Change Period (Y+Rc), s	7.0		7.0		7.0	
Max Green Setting (Gmax), s	72.2		33.8		72.2	
Max Q Clear Time (g_c+l1), s	21.3		19.0		43.4	
Green Ext Time (p_c), s	19.4		1.0		21.8	
Intersection Summary						
HCM 7th Control Delay, s/veh			12.8			
HCM 7th LOS			B			

Intersection												
Int Delay, s/veh	5.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	63	0	25	0	23	10	0
Future Vol, veh/h	0	0	0	0	0	63	0	25	0	23	10	0
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	68	0	27	0	25	11	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	88	88	11	88	88	27	11	0	0	27	0	0
Stage 1	61	61	-	27	27	-	-	-	-	-	-	-
Stage 2	27	27	-	61	61	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	897	802	1070	897	802	1048	1608	-	-	1587	-	-
Stage 1	950	844	-	990	873	-	-	-	-	-	-	-
Stage 2	990	873	-	950	844	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	825	789	1070	883	789	1048	1608	-	-	1587	-	-
Mov Cap-2 Maneuver	825	789	-	883	789	-	-	-	-	-	-	-
Stage 1	935	831	-	990	873	-	-	-	-	-	-	-
Stage 2	925	873	-	935	831	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	0		8.67		0		5.09	
HCM LOS	A		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1608	-	-	-	1048	1255	-
HCM Lane V/C Ratio	-	-	-	-	0.065	0.016	-
HCM Control Delay (s/veh)	0	-	-	0	8.7	7.3	0
HCM Lane LOS	A	-	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0	-

Intersection						
Int Delay, s/veh	3.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	75	28	8	680	595	26
Future Vol, veh/h	75	28	8	680	595	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	175	-	-	135
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	82	30	9	739	647	28
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1403	647	675	0	-	0
Stage 1	647	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	154	471	916	-	-	-
Stage 1	521	-	-	-	-	-
Stage 2	463	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	153	471	916	-	-	-
Mov Cap-2 Maneuver	153	-	-	-	-	-
Stage 1	516	-	-	-	-	-
Stage 2	463	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v42.09		0.1		0		
HCM LOS	E					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	916	-	153	471	-	-
HCM Lane V/C Ratio	0.009	-	0.535	0.065	-	-
HCM Control Delay (s/veh)	9	-	52.9	13.2	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0	-	2.7	0.2	-	-

Intersection

Int Delay, s/veh 3.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	46	26	8	52	4
Future Vol, veh/h	1	46	26	8	52	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	50	28	9	57	4

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	37	0	0 85 33
Stage 1	-	-	- - 33 -
Stage 2	-	-	- - 52 -
Critical Hdwy	4.12	-	- - 6.42 6.22
Critical Hdwy Stg 1	-	-	- - 5.42 -
Critical Hdwy Stg 2	-	-	- - 5.42 -
Follow-up Hdwy	2.218	-	- - 3.518 3.318
Pot Cap-1 Maneuver	1574	-	- - 917 1041
Stage 1	-	-	- - 990 -
Stage 2	-	-	- - 970 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1574	-	- - 916 1041
Mov Cap-2 Maneuver	-	-	- - 916 -
Stage 1	-	-	- - 989 -
Stage 2	-	-	- - 970 -

Approach	EB	WB	SB
HCM Control Delay, s/v 0.16		0	9.17
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	38	-	-	-	924
HCM Lane V/C Ratio	0.001	-	-	-	0.066
HCM Control Delay (s/veh)	7.3	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection												
Int Delay, s/veh	5.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	5	5	5	5	8	5	0	5	26	0	4
Future Vol, veh/h	1	5	5	5	5	8	5	0	5	26	0	4
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	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	1	5	5	5	5	9	5	0	5	28	0	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	14	0	0	11	0	0	27	35	8	28	34	10
Stage 1	-	-	-	-	-	-	10	10	-	21	21	-
Stage 2	-	-	-	-	-	-	16	25	-	8	13	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1604	-	-	1608	-	-	983	857	1074	981	859	1072
Stage 1	-	-	-	-	-	-	1011	887	-	998	878	-
Stage 2	-	-	-	-	-	-	1003	874	-	1014	885	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1604	-	-	1608	-	-	975	854	1074	972	855	1072
Mov Cap-2 Maneuver	-	-	-	-	-	-	975	854	-	972	855	-
Stage 1	-	-	-	-	-	-	1010	886	-	995	875	-
Stage 2	-	-	-	-	-	-	996	871	-	1008	884	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.66			2.01			8.56			8.78		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	1022	149	-	-	445	-	-	984				
HCM Lane V/C Ratio	0.011	0.001	-	-	0.003	-	-	0.033				
HCM Control Delay (s/veh)	8.6	7.2	0	-	7.2	0	-	8.8				
HCM Lane LOS	A	A	A	-	A	A	-	A				
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.1				

Timings

1: Chambers Rd & E. 104th Ave

2044 PROJECT PM

Chambers Rd Apartments Traffic Impact Study

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	1240	317	163	1245	395	379	428	180	475	435	145
Future Volume (vph)	340	1240	317	163	1245	395	379	428	180	475	435	145
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		7	4		3	8	5
Permitted Phases			2			6	4		4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	5
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	5.0
Minimum Split (s)	10.5	23.5	23.5	10.5	24.5	24.5	9.5	23.5	23.5	10.5	24.5	10.5
Total Split (s)	22.0	49.8	49.8	16.7	44.5	44.5	29.0	31.0	31.0	22.5	24.5	22.0
Total Split (%)	18.3%	41.5%	41.5%	13.9%	37.1%	37.1%	24.2%	25.8%	25.8%	18.8%	20.4%	18.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	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	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	4.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None
Act Effect Green (s)	16.7	49.2	49.2	10.7	43.2	43.2	38.3	21.5	21.5	39.9	23.3	45.5
Actuated g/C Ratio	0.14	0.41	0.41	0.09	0.36	0.36	0.32	0.18	0.18	0.33	0.19	0.38
v/c Ratio	0.80	0.67	0.41	0.59	0.76	0.53	0.63	0.73	0.44	0.80	0.69	0.24
Control Delay (s/veh)	70.3	29.7	8.1	61.0	38.2	6.3	32.8	55.6	12.5	39.0	50.6	8.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	70.3	29.7	8.1	61.0	38.2	6.3	32.8	55.6	12.5	39.0	50.6	8.8
LOS	E	C	A	E	D	A	C	E	B	D	D	A
Approach Delay (s/veh)		33.4			33.3			39.0			39.6	
Approach LOS		C			C			D			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay (s/veh): 35.4

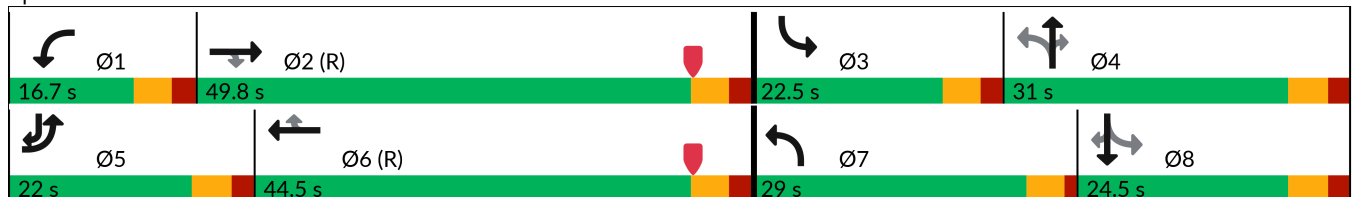
Intersection LOS: D

Intersection Capacity Utilization 77.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Chambers Rd & E. 104th Ave



Queues

1: Chambers Rd & E. 104th Ave

2044 PROJECT PM

Chambers Rd Apartments Traffic Impact Study

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	370	1348	345	177	1353	429	412	465	196	516	473	158
v/c Ratio	0.80	0.67	0.41	0.59	0.76	0.53	0.63	0.73	0.44	0.80	0.69	0.24
Control Delay (s/veh)	70.3	29.7	8.1	61.0	38.2	6.3	32.8	55.6	12.5	39.0	50.6	8.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	70.3	29.7	8.1	61.0	38.2	6.3	32.8	55.6	12.5	39.0	50.6	8.8
Queue Length 50th (ft)	158	171	19	68	349	11	122	186	14	151	178	21
Queue Length 95th (ft)	m#199	286	m117	106	417	93	m157	m234	m69	189	239	67
Internal Link Dist (ft)	2580				955				548			
Turn Bay Length (ft)	275		300	380		350	290		250	285		250
Base Capacity (vph)	478	2023	833	319	1776	814	880	752	487	654	687	677
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.67	0.41	0.55	0.76	0.53	0.47	0.62	0.40	0.79	0.69	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

HCM 7th Signalized Intersection Summary

1: Chambers Rd & E. 104th Ave

2044 PROJECT PM

Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	340	1240	317	163	1245	395	379	428	180	475	435	145
Future Volume (veh/h)	340	1240	317	163	1245	395	379	428	180	475	435	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	370	1348	345	177	1353	0	412	465	196	516	473	158
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	2	2	2	2	2	2
Cap, veh/h	420	2221	690	234	1946		641	576	257	657	666	494
Arrive On Green	0.25	0.89	0.89	0.07	0.39	0.00	0.12	0.16	0.16	0.14	0.19	0.19
Sat Flow, veh/h	3374	4985	1547	3374	4985	1547	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	370	1348	345	177	1353	0	412	465	196	516	473	158
Grp Sat Flow(s),veh/h/ln	1687	1662	1547	1687	1662	1547	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	12.7	7.7	5.2	6.2	27.2	0.0	11.6	15.1	14.2	14.7	15.0	9.1
Cycle Q Clear(g_c), s	12.7	7.7	5.2	6.2	27.2	0.0	11.6	15.1	14.2	14.7	15.0	9.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	420	2221	690	234	1946		641	576	257	657	666	494
V/C Ratio(X)	0.88	0.61	0.50	0.76	0.70		0.64	0.81	0.76	0.79	0.71	0.32
Avail Cap(c_a), veh/h	464	2221	690	315	1946		922	755	337	663	666	494
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.52	0.52	0.52	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.2	4.0	3.9	54.9	30.6	0.0	35.7	48.5	48.1	35.7	45.7	31.6
Incr Delay (d2), s/veh	9.6	0.6	1.4	7.1	2.1	0.0	1.1	4.9	7.3	6.1	3.5	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	1.5	1.3	2.8	10.7	0.0	4.9	7.0	6.0	6.6	6.8	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	53.8	4.7	5.3	62.0	32.7	0.0	36.7	53.4	55.4	41.9	49.2	31.9
LnGrp LOS	D	A	A	E	C		D	D	E	D	D	C
Approach Vol, veh/h	2063			1530			1073			1147		
Approach Delay, s/veh	13.6			36.1			47.4			43.5		
Approach LOS	B			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.8	59.0	22.3	24.9	20.4	52.4	19.2	28.0				
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	4.5	5.5				
Max Green Setting (Gmax), s	11.2	44.3	17.0	25.5	16.5	39.0	24.5	19.0				
Max Q Clear Time (g_c+I1), s	8.2	9.7	16.7	17.1	14.7	29.2	13.6	17.0				
Green Ext Time (p_c), s	0.1	13.4	0.1	2.3	0.3	5.8	1.1	0.7				

Intersection Summary

HCM 7th Control Delay, s/veh

31.7

HCM 7th LOS

C

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Chambers Rd & 96th Ave

2044 PROJECT PM
Chambers Rd Apartments Traffic Impact Study

							
Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	433	1065	810	264	2	270	2
Future Volume (vph)	433	1065	810	264	2	270	2
Turn Type	Prot	NA	NA	Perm	NA	Split	NA
Protected Phases	5	2	6		8	4	4
Permitted Phases				6			
Detector Phase	5	2	6	6	8	4	4
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	23.0	49.0	26.0	26.0	23.0	23.0	23.0
Total Split (%)	24.2%	51.6%	27.4%	27.4%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag	Lag			
Lead-Lag Optimize?	Yes		Yes	Yes			
Recall Mode	None	Min	None	None	None	None	None
Act Effect Green (s)	18.1	44.2	21.1	21.1	5.8	16.8	16.8
Actuated g/C Ratio	0.25	0.60	0.29	0.29	0.08	0.23	0.23
v/c Ratio	1.00	0.52	0.98	0.42	0.06	0.73	0.35
Control Delay (s/veh)	74.0	10.3	55.4	5.5	27.5	39.1	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	74.0	10.3	55.4	5.5	27.5	39.1	6.9
LOS	E	B	E	A	C	D	A
Approach Delay (s/veh)		28.7	43.1		27.5		27.2
Approach LOS		C	D		C		C

Intersection Summary

Cycle Length: 95

Actuated Cycle Length: 73.1

Natural Cycle: 125

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.00

Intersection Signal Delay (s/veh): 33.7

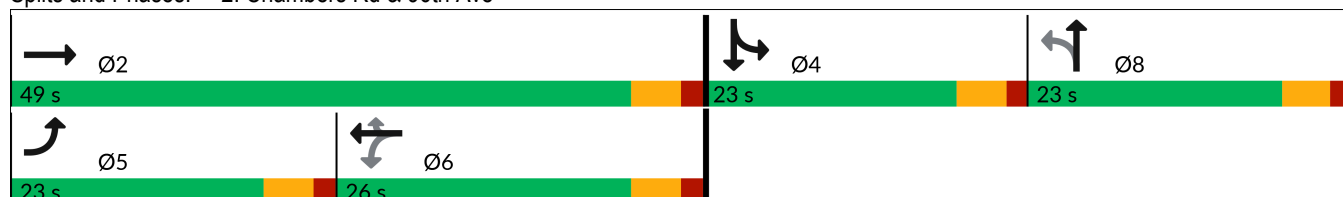
Intersection LOS: C

Intersection Capacity Utilization 86.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: Chambers Rd & 96th Ave



Queues

2: Chambers Rd & 96th Ave

2044 PROJECT PM

Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	446	1098	853	278	8	293	172
v/c Ratio	1.00	0.52	0.98	0.42	0.06	0.73	0.35
Control Delay (s/veh)	74.0	10.3	55.4	5.5	27.5	39.1	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	74.0	10.3	55.4	5.5	27.5	39.1	6.9
Queue Length 50th (ft)	198	128	195	0	2	117	1
Queue Length 95th (ft)	#457	258	#392	58	8	#267	50
Internal Link Dist (ft)		1966	2271		176		2584
Turn Bay Length (ft)	425			300		175	
Base Capacity (vph)	446	2099	868	659	441	433	520
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.52	0.98	0.42	0.02	0.68	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 7th Signalized Intersection Summary

2: Chambers Rd & 96th Ave

2044 PROJECT PM
Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	433	1065	0	0	810	264	0	2	2	270	2	156
Future Volume (veh/h)	433	1065	0	0	810	264	0	2	2	270	2	156
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1900	1900	1604	1885	1900	1900	1900	1856	1900	1870
Adj Flow Rate, veh/h	446	1098	0	0	853	278	0	4	4	293	2	170
Peak Hour Factor	0.97	0.97	0.97	0.95	0.95	0.95	0.50	0.50	0.50	0.92	0.92	0.92
Percent Heavy Veh, %	0	4	0	0	20	1	0	0	0	3	0	2
Cap, veh/h	438	2068	0	0	860	451	0	9	9	348	4	314
Arrive On Green	0.24	0.59	0.00	0.00	0.28	0.28	0.00	0.01	0.01	0.20	0.20	0.20
Sat Flow, veh/h	1810	3589	0	0	3127	1598	0	872	872	1767	19	1594
Grp Volume(v), veh/h	446	1098	0	0	853	278	0	0	8	293	0	172
Grp Sat Flow(s),veh/h/ln	1810	1749	0	0	1523	1598	0	0	1743	1767	0	1613
Q Serve(g_s), s	18.0	13.9	0.0	0.0	20.8	11.3	0.0	0.0	0.3	11.9	0.0	7.1
Cycle Q Clear(g_c), s	18.0	13.9	0.0	0.0	20.8	11.3	0.0	0.0	0.3	11.9	0.0	7.1
Prop In Lane	1.00		0.00	0.00		1.00	0.00		0.50	1.00		0.99
Lane Grp Cap(c), veh/h	438	2068	0	0	860	451	0	0	18	348	0	317
V/C Ratio(X)	1.02	0.53	0.00	0.00	0.99	0.62	0.00	0.00	0.45	0.84	0.00	0.54
Avail Cap(c_a), veh/h	438	2068	0	0	860	451	0	0	422	427	0	390
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.2	9.1	0.0	0.0	26.6	23.2	0.0	0.0	36.6	28.8	0.0	26.9
Incr Delay (d2), s/veh	47.9	0.3	0.0	0.0	28.6	2.5	0.0	0.0	16.6	12.0	0.0	1.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.2	4.5	0.0	0.0	10.5	4.3	0.0	0.0	0.2	5.8	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	76.1	9.3	0.0	0.0	55.2	25.7	0.0	0.0	53.2	40.8	0.0	28.3
LnGrp LOS	F	A			E	C			D	D		C
Approach Vol, veh/h	1544			1131			8			465		
Approach Delay, s/veh	28.6			48.0			53.2			36.1		
Approach LOS	C			D			D			D		
Timer - Assigned Phs	2			4		5	6		8			
Phs Duration (G+Y+Rc), s	49.0			19.6		23.0	26.0		5.8			
Change Period (Y+Rc), s	5.0			5.0		5.0	5.0		5.0			
Max Green Setting (Gmax), s	44.0			18.0		18.0	21.0		18.0			
Max Q Clear Time (g_c+I1), s	15.9			13.9		20.0	22.8		2.3			
Green Ext Time (p_c), s	9.4			0.8		0.0	0.0		0.0			
Intersection Summary												
HCM 7th Control Delay, s/veh	36.7											
HCM 7th LOS	D											

Timings 3: Chambers Rd & 100th Avenue

Year 2044 w/Project PM
Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	55	8	45	11	55	592	245	466	85
Future Volume (vph)	55	8	45	11	55	592	245	466	85
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4		8		2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	2	2	6	6	6
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)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.5	22.5	22.5	22.5	97.5	97.5	97.5	97.5	97.5
Total Split (%)	18.8%	18.8%	18.8%	18.8%	81.3%	81.3%	81.3%	81.3%	81.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
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)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max
Act Effect Green (s)	15.5	15.5	15.5	15.5	95.5	95.5	95.5	95.5	95.5
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.80	0.80	0.80	0.80	0.80
v/c Ratio	0.97	0.13	0.28	0.56	0.09	0.52	0.55	0.34	0.07
Control Delay	157.5	23.5	49.9	13.6	3.5	5.9	11.8	2.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	157.5	23.5	49.9	13.6	3.5	5.9	11.8	2.7	0.2
LOS	F	C	D	B	A	A	B	A	A
Approach Delay		111.9		20.4		5.8		5.2	
Approach LOS		F		C		A		A	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 12.2

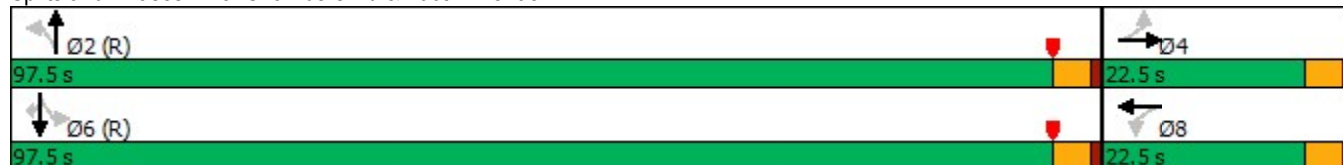
Intersection LOS: B

Intersection Capacity Utilization 82.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: Chambers Rd & 100th Avenue



Queues
3: Chambers Rd & 100th Avenue

Year 2044 w/Project PM
Chambers Rd Apartments Traffic Impact Study



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	60	31	49	213	60	752	266	507	92
v/c Ratio	0.97	0.13	0.28	0.56	0.09	0.52	0.55	0.34	0.07
Control Delay	157.5	23.5	49.9	13.6	3.5	5.9	11.8	2.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	157.5	23.5	49.9	13.6	3.5	5.9	11.8	2.7	0.2
Queue Length 50th (ft)	46	6	34	8	9	179	40	61	0
Queue Length 95th (ft)	#130	35	73	80	20	251	125	73	m1
Internal Link Dist (ft)		625		478		2584		1270	
Turn Bay Length (ft)	150		100		235		235		135
Base Capacity (vph)	72	268	205	410	669	1454	486	1482	1278
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	0.83	0.12	0.24	0.52	0.09	0.52	0.55	0.34	0.07

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

HCM 6th Signalized Intersection Summary

3: Chambers Rd & 100th Avenue

Year 2044 w/Project PM
Chambers Rd Apartments Traffic Impact Study

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	8	20	45	11	185	55	592	100	245	466	85
Future Volume (veh/h)	55	8	20	45	11	185	55	592	100	245	466	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	60	9	22	49	12	201	60	643	109	266	507	92
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	83	72	177	244	14	226	677	1208	205	499	1450	1228
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.77	0.77	0.77	0.77	0.77	0.77
Sat Flow, veh/h	1168	482	1177	1378	90	1509	892	1559	264	711	1870	1585
Grp Volume(v), veh/h	60	0	31	49	0	213	60	0	752	266	507	92
Grp Sat Flow(s),veh/h/ln	1168	0	1659	1378	0	1599	892	0	1823	711	1870	1585
Q Serve(g_s), s	2.3	0.0	1.9	3.8	0.0	15.7	2.7	0.0	19.0	27.5	10.0	1.7
Cycle Q Clear(g_c), s	18.0	0.0	1.9	5.8	0.0	15.7	12.7	0.0	19.0	46.4	10.0	1.7
Prop In Lane	1.00		0.71	1.00		0.94	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	83	0	249	244	0	240	677	0	1413	499	1450	1228
V/C Ratio(X)	0.73	0.00	0.12	0.20	0.00	0.89	0.09	0.00	0.53	0.53	0.35	0.07
Avail Cap(c_a), veh/h	83	0	249	244	0	240	677	0	1413	499	1450	1228
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.53	0.00	0.53	1.00	1.00	1.00
Uniform Delay (d), s/veh	59.6	0.0	44.2	46.7	0.0	50.0	6.1	0.0	5.2	14.1	4.2	3.2
Incr Delay (d2), s/veh	27.1	0.0	0.2	0.4	0.0	30.6	0.1	0.0	0.8	4.1	0.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	0.8	1.3	0.0	8.3	0.5	0.0	6.2	4.8	3.5	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	86.6	0.0	44.4	47.1	0.0	80.6	6.3	0.0	5.9	18.1	4.8	3.3
LnGrp LOS	F	A	D	D	A	F	A	A	A	B	A	A
Approach Vol, veh/h	91			262			812			865		
Approach Delay, s/veh	72.2			74.3			6.0			8.8		
Approach LOS	E			E			A			A		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	97.5			22.5			97.5			22.5		
Change Period (Y+Rc), s	4.5			4.5			4.5			4.5		
Max Green Setting (Gmax), s	93.0			18.0			93.0			18.0		
Max Q Clear Time (g_c+I1), s	21.0			20.0			48.4			17.7		
Green Ext Time (p_c), s	7.5			0.0			7.1			0.0		
Intersection Summary												
HCM 6th Ctrl Delay	18.9											
HCM 6th LOS	B											

Timings

4: Sable Blvd & E. 104th Ave

2044 PROJECT PM

Chambers Rd Apartments Traffic Impact Study

	→	↖	←	↙	↗
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↖	↑↑↑	↖	↗
Traffic Volume (vph)	2202	135	1889	115	85
Future Volume (vph)	2202	135	1889	115	85
Turn Type	NA	pm+pt	NA	Prot	Perm
Protected Phases	2	1	6	4	
Permitted Phases		6			4
Detector Phase	2	1	6	4	4
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	37.0	9.5	22.5	35.0	35.0
Total Split (s)	70.3	14.7	85.0	35.0	35.0
Total Split (%)	58.6%	12.3%	70.8%	29.2%	29.2%
Yellow Time (s)	5.0	3.5	5.0	5.0	5.0
All-Red Time (s)	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	4.5	7.0	7.0	7.0
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	C-Max	None	C-Max	None	None
Act Effect Green (s)	76.5	94.7	92.2	13.8	13.8
Actuated g/C Ratio	0.64	0.79	0.77	0.12	0.12
v/c Ratio	0.80	0.67	0.54	0.62	0.35
Control Delay (s/veh)	20.1	34.7	9.4	62.9	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	20.1	34.7	9.4	62.9	12.9
LOS	C	C	A	E	B
Approach Delay (s/veh)	20.1		11.1	41.7	
Approach LOS	C		B	D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Natural Cycle: 105

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay (s/veh): 17.0

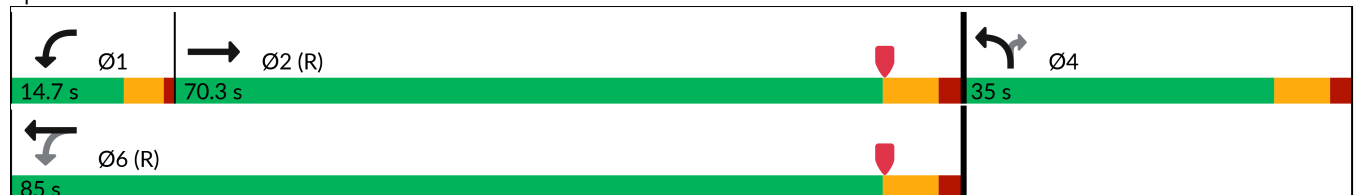
Intersection LOS: B

Intersection Capacity Utilization 74.3%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: Sable Blvd & E. 104th Ave



Queues

4: Sable Blvd & E. 104th Ave

2044 PROJECT PM

Chambers Rd Apartments Traffic Impact Study

	→	↙	←	↖	↗
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	2517	147	2053	125	92
v/c Ratio	0.80	0.67	0.54	0.62	0.35
Control Delay (s/veh)	20.1	34.7	9.4	62.9	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	20.1	34.7	9.4	62.9	12.9
Queue Length 50th (ft)	487	37	421	94	0
Queue Length 95th (ft)	715	m82	478	151	47
Internal Link Dist (ft)	374		2580	1227	
Turn Bay Length (ft)		300		125	
Base Capacity (vph)	3132	235	3794	413	439
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.63	0.54	0.30	0.21

Intersection Summary

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

HCM 7th Signalized Intersection Summary

4: Sable Blvd & E. 104th Ave

2044 PROJECT PM
Chambers Rd Apartments Traffic Impact Study

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	↗
Traffic Volume (veh/h)	2202	114	135	1889	115	85
Future Volume (veh/h)	2202	114	135	1889	115	85
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1870	1870
Adj Flow Rate, veh/h	2393	124	147	2053	125	92
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	2	2
Cap, veh/h	3468	178	186	3954	160	143
Arrive On Green	0.71	0.71	0.03	0.53	0.09	0.09
Sat Flow, veh/h	5019	249	1739	5149	1781	1585
Grp Volume(v), veh/h	1631	886	147	2053	125	92
Grp Sat Flow(s),veh/h/ln	1662	1781	1739	1662	1781	1585
Q Serve(g_s), s	33.0	33.9	2.5	32.0	8.2	6.7
Cycle Q Clear(g_c), s	33.0	33.9	2.5	32.0	8.2	6.7
Prop In Lane		0.14	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2374	1272	186	3954	160	143
V/C Ratio(X)	0.69	0.70	0.79	0.52	0.78	0.64
Avail Cap(c_a), veh/h	2374	1272	262	3954	416	370
HCM Platoon Ratio	1.00	1.00	0.67	0.67	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.66	0.66	1.00	1.00
Uniform Delay (d), s/veh	9.6	9.7	26.4	13.3	53.4	52.7
Incr Delay (d2), s/veh	1.6	3.2	6.9	0.3	7.9	4.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.2	12.8	3.6	13.1	4.0	2.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	11.3	12.9	33.3	13.6	61.4	57.5
LnGrp LOS	B	B	C	B	E	E
Approach Vol, veh/h	2517			2200	217	
Approach Delay, s/veh	11.8			14.9	59.7	
Approach LOS	B			B	E	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	9.5	92.7		17.8		102.2
Change Period (Y+Rc), s	4.5	7.0		7.0		7.0
Max Green Setting (Gmax), s	10.2	63.3		28.0		78.0
Max Q Clear Time (g_c+I1), s	4.5	35.9		10.2		34.0
Green Ext Time (p_c), s	0.2	22.5		0.6		26.2
Intersection Summary						
HCM 7th Control Delay, s/veh			15.3			
HCM 7th LOS			B			

Intersection												
Int Delay, s/veh	5.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	0	0	0	0	0	45	0	20	0	69	30	0
Future Vol, veh/h	0	0	0	0	0	45	0	20	0	69	30	0
Conflicting Peds, #/hr	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
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	0	0	0	0	0	49	0	22	0	75	33	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	204	204	33	204	204	22	33	0	0	22	0	0
Stage 1	183	183	-	22	22	-	-	-	-	-	-	-
Stage 2	22	22	-	183	183	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	754	692	1041	754	692	1055	1579	-	-	1594	-	-
Stage 1	819	749	-	997	877	-	-	-	-	-	-	-
Stage 2	997	877	-	819	749	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	684	659	1041	717	659	1055	1579	-	-	1594	-	-
Mov Cap-2 Maneuver	684	659	-	717	659	-	-	-	-	-	-	-
Stage 1	780	713	-	997	877	-	-	-	-	-	-	-
Stage 2	951	877	-	780	713	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s/v	0		8.58		0		5.14	
HCM LOS	A		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1579	-	-	-	1055	1255	-
HCM Lane V/C Ratio	-	-	-	-	0.046	0.047	-
HCM Control Delay (s/veh)	0	-	-	0	8.6	7.4	0
HCM Lane LOS	A	-	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0.1	-

Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	42	16	29	765	720	78
Future Vol, veh/h	42	16	29	765	720	78
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	175	-	-	135
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	46	17	32	832	783	85
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1677	783	867	0	-	0
Stage 1	783	-	-	-	-	-
Stage 2	895	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	105	394	776	-	-	-
Stage 1	451	-	-	-	-	-
Stage 2	399	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	100	394	776	-	-	-
Mov Cap-2 Maneuver	100	-	-	-	-	-
Stage 1	432	-	-	-	-	-
Stage 2	399	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	53.17	0.36		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	776	-	100	394	-	-
HCM Lane V/C Ratio	0.041	-	0.455	0.044	-	-
HCM Control Delay (s/veh)	9.8	-	67.9	14.6	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.9	0.1	-	-

Intersection

Int Delay, s/veh 2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	26	75	27	32	3
Future Vol, veh/h	5	26	75	27	32	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	28	82	29	35	3

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	111	0	0 135 96
Stage 1	-	-	- 96 -
Stage 2	-	-	- 39 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1479	-	- 858 960
Stage 1	-	-	- 928 -
Stage 2	-	-	- 983 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1479	-	- 855 960
Mov Cap-2 Maneuver	-	-	- 855 -
Stage 1	-	-	- 924 -
Stage 2	-	-	- 983 -

Approach	EB	WB	SB
HCM Control Delay, s/v	1.2	0	9.36
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	290	-	-	-	863
HCM Lane V/C Ratio	0.004	-	-	-	0.044
HCM Control Delay (s/veh)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

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	5	5	5	5	5	27	5	0	5	16	0	3
Future Vol, veh/h	5	5	5	5	5	27	5	0	5	16	0	3
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	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
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	5	5	5	5	29	5	0	5	17	0	3
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	35	0	0	11	0	0	35	65	8	47	53	20
Stage 1	-	-	-	-	-	-	19	19	-	31	31	-
Stage 2	-	-	-	-	-	-	16	46	-	16	22	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1577	-	-	1608	-	-	971	826	1074	954	839	1058
Stage 1	-	-	-	-	-	-	1000	879	-	986	869	-
Stage 2	-	-	-	-	-	-	1003	857	-	1003	877	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1577	-	-	1608	-	-	961	820	1074	942	833	1058
Mov Cap-2 Maneuver	-	-	-	-	-	-	961	820	-	942	833	-
Stage 1	-	-	-	-	-	-	997	876	-	982	866	-
Stage 2	-	-	-	-	-	-	997	854	-	995	874	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	2.43			0.98			8.59			8.84		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	1014	545	-	-	208	-	-	959				
HCM Lane V/C Ratio	0.011	0.003	-	-	0.003	-	-	0.022				
HCM Control Delay (s/veh)	8.6	7.3	0	-	7.2	0	-	8.8				
HCM Lane LOS	A	A	A	-	A	A	-	A				
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.1				

*MUTCD Peak Hour Signal Warrant
102nd Avenue & Chambers Road*

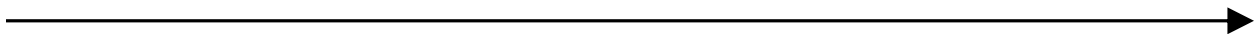
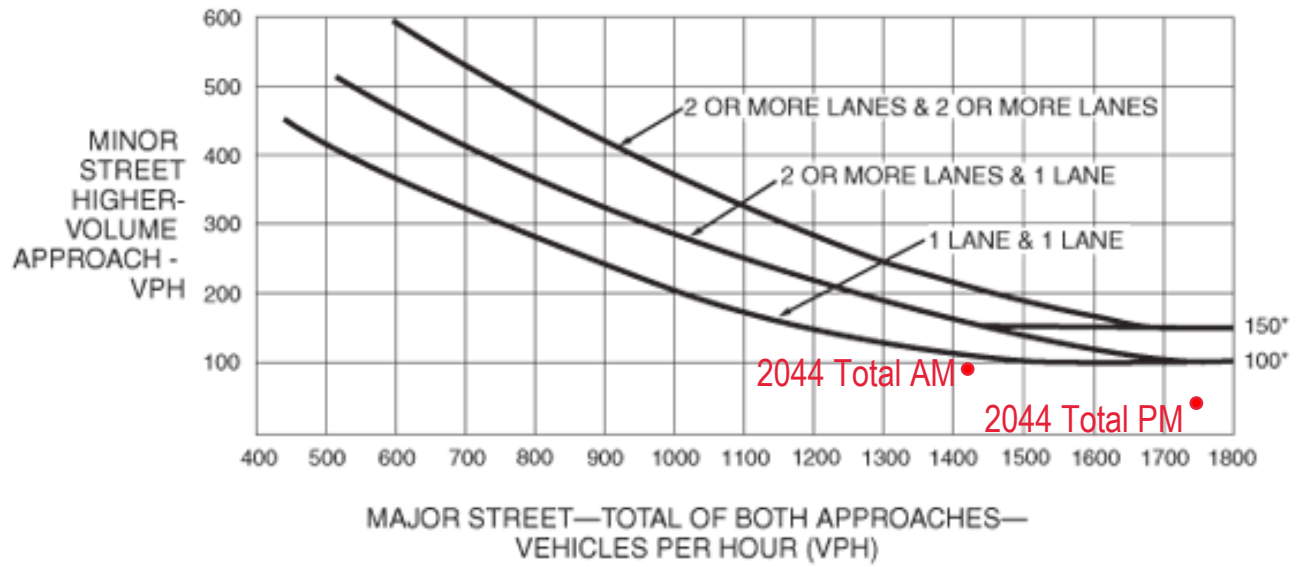


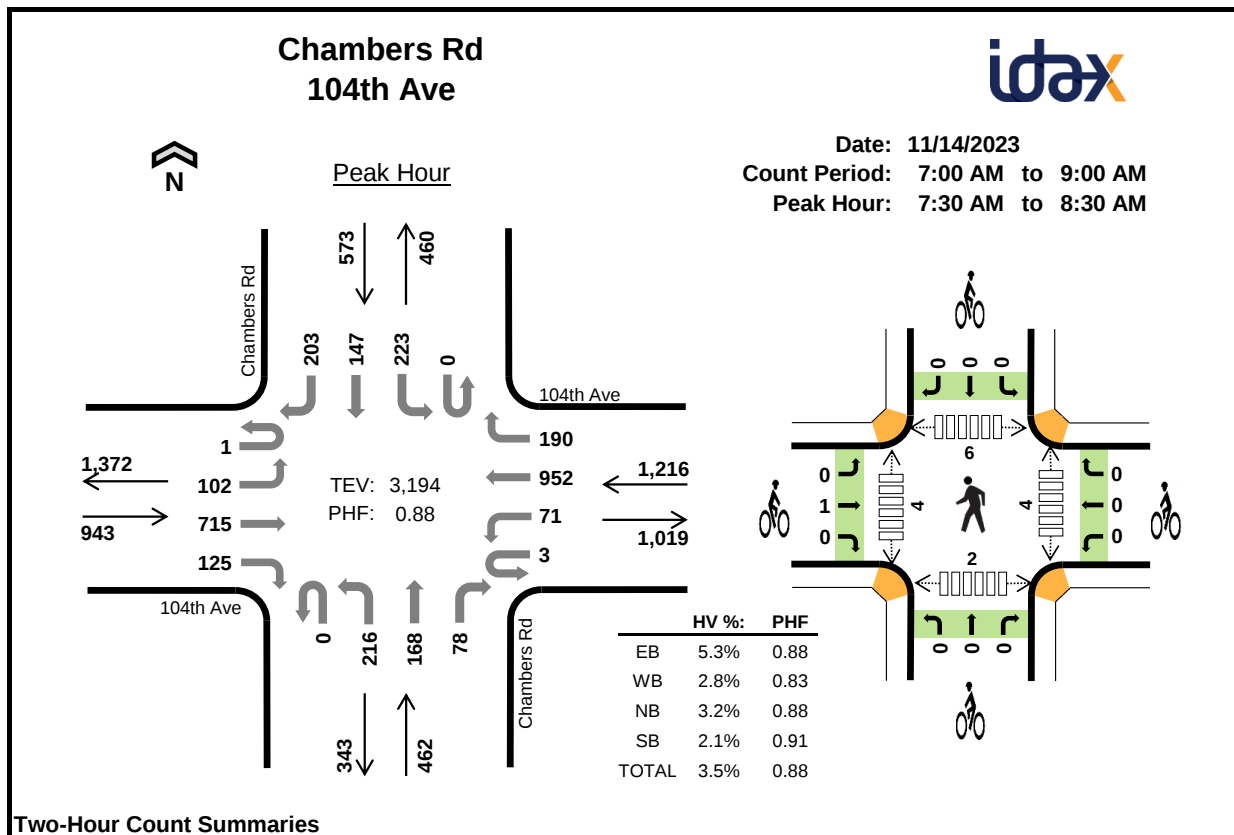
Figure 4C-3. Warrant 3, Peak Hour



*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.

Traffic Count Data Sheets



**Two-Hour Count Summaries**

Interval Start		104th Ave				104th Ave				Chambers Rd				Chambers Rd				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM		0	7	146	18	0	3	185	30	0	35	45	8	0	32	47	32	588	0
7:15 AM		0	15	173	29	0	11	202	28	0	42	36	15	0	46	45	55	697	0
7:30 AM		0	26	198	43	0	10	206	40	0	65	31	28	0	42	36	65	790	0
7:45 AM		0	38	186	28	0	29	292	45	0	48	58	26	0	58	40	60	908	2,983
8:00 AM		1	20	142	25	3	19	264	51	0	57	42	15	0	68	35	49	791	3,186
8:15 AM		0	18	189	29	0	13	190	54	0	46	37	9	0	55	36	29	705	3,194
8:30 AM		0	24	132	25	0	9	150	39	0	32	31	4	0	59	45	23	573	2,977
8:45 AM		0	23	122	22	0	5	143	32	0	28	25	11	0	26	24	29	490	2,559
Count Total		1	171	1,288	219	3	99	1,632	319	0	353	305	116	0	386	308	342	5,542	0
Peak Hour	All	1	102	715	125	3	71	952	190	0	216	168	78	0	223	147	203	3,194	0
	HV	0	5	41	4	0	2	25	7	0	5	9	1	0	5	5	2	111	0
	HV%	0%	5%	6%	3%	0%	3%	3%	4%	-	2%	5%	1%	-	2%	3%	1%	3%	0

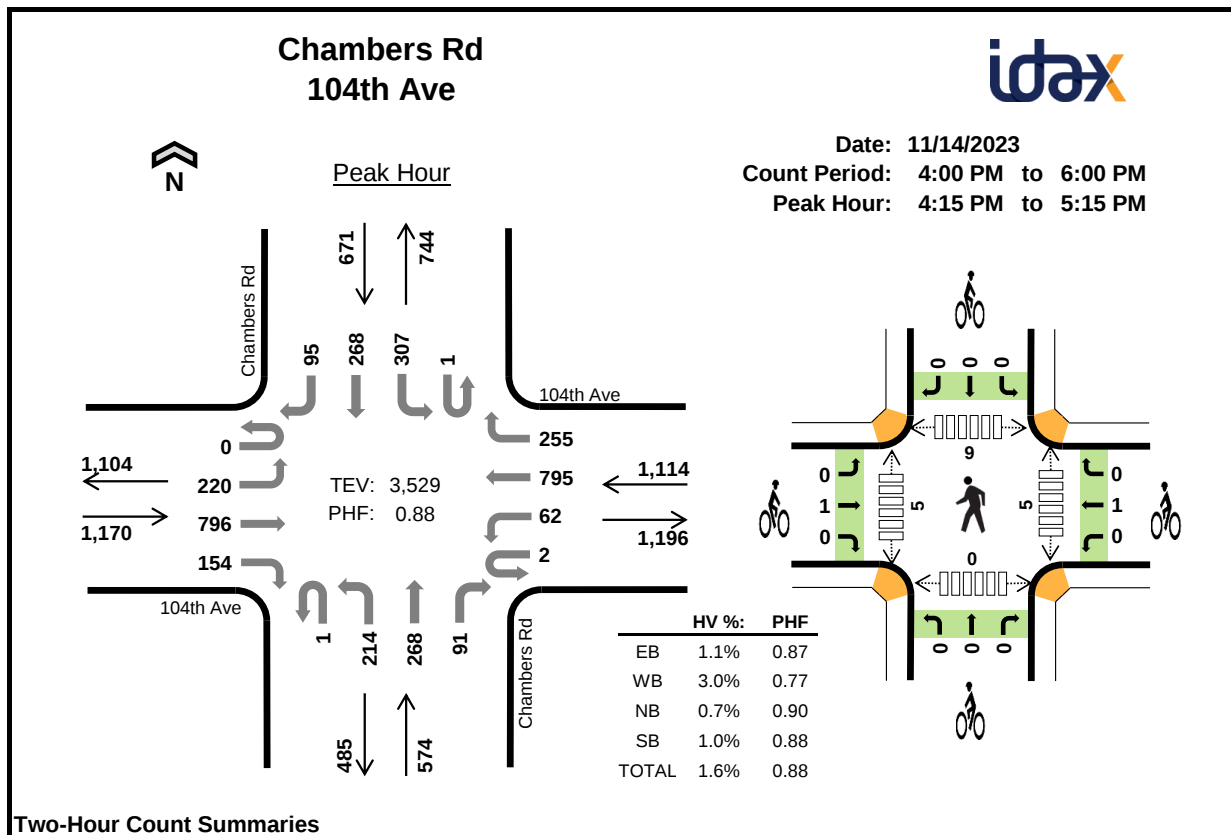
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	16	5	3	2	26	0	0	0	0	0	1	0	2	0	3
7:15 AM	13	4	3	5	25	0	0	0	0	0	1	1	1	0	3
7:30 AM	16	9	3	3	31	1	0	0	0	1	3	0	3	1	7
7:45 AM	13	10	3	6	32	0	0	0	0	0	0	3	1	0	4
8:00 AM	7	6	7	1	21	0	0	0	0	0	1	0	2	0	3
8:15 AM	14	9	2	2	27	0	0	0	0	0	0	1	0	1	2
8:30 AM	7	6	2	1	16	0	0	0	0	0	0	0	0	1	1
8:45 AM	9	6	1	2	18	0	0	0	0	0	0	0	0	1	1
Count Total	95	55	24	22	196	1	0	0	0	1	6	5	9	4	24
Peak Hour	50	34	15	12	111	1	0	0	0	1	4	4	6	2	16

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	104th Ave				104th Ave				Chambers Rd				Chambers Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	16	0	0	0	5	0	0	0	2	1	0	0	2	0	26	0
7:15 AM	0	1	10	2	0	1	1	2	0	1	1	1	0	2	1	2	25	0
7:30 AM	0	1	13	2	0	0	8	1	0	1	1	1	0	2	1	0	31	0
7:45 AM	0	4	7	2	0	2	6	2	0	1	2	0	0	1	3	2	32	114
8:00 AM	0	0	7	0	0	0	6	0	0	2	5	0	0	1	0	0	21	109
8:15 AM	0	0	14	0	0	0	5	4	0	1	1	0	0	1	1	0	27	111
8:30 AM	0	1	5	1	0	0	4	2	0	1	1	0	0	0	1	0	16	96
8:45 AM	0	2	7	0	0	0	4	2	0	1	0	0	0	1	0	1	18	82
Count Total	0	9	79	7	0	3	39	13	0	8	13	3	0	8	9	5	196	0
Peak Hour	0	5	41	4	0	2	25	7	0	5	9	1	0	5	5	2	111	0

Two-Hour Count Summaries - Bikes																		
Interval Start	104th Ave			104th Ave			Chambers Rd			Chambers Rd			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
7:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	1	0				
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Count Total	0	1	0	0	0	0	0	0	0	0	0	0	1	0				
Peak Hour	0	1	0	0	0	0	0	0	0	0	0	0	1	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

**Two-Hour Count Summaries**

Interval Start		104th Ave				104th Ave				Chambers Rd				Chambers Rd				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	51	175	31	0	15	178	48	2	45	45	15	0	79	58	23	765	0
4:15 PM		0	42	193	36	0	18	181	48	1	43	63	17	0	84	78	19	823	0
4:30 PM		0	56	191	30	2	14	200	59	0	59	66	29	0	73	61	16	856	0
4:45 PM		0	76	216	43	0	16	261	84	0	62	75	23	1	66	57	26	1,006	3,450
5:00 PM		0	46	196	45	0	14	153	64	0	50	64	22	0	84	72	34	844	3,529
5:15 PM		0	55	205	38	0	12	159	60	0	42	49	18	2	65	58	22	785	3,491
5:30 PM		0	67	163	21	0	10	147	69	0	51	66	24	0	64	68	21	771	3,406
5:45 PM		0	56	156	28	0	11	135	57	0	45	43	14	0	76	51	30	702	3,102
Count Total		0	449	1,495	272	2	110	1,414	489	3	397	471	162	3	591	503	191	6,552	0
Peak Hour	All	0	220	796	154	2	62	795	255	1	214	268	91	1	307	268	95	3,529	0
	HV	0	1	8	4	0	3	26	4	0	2	2	0	0	3	0	4	57	0
	HV%	-	0%	1%	3%	0%	5%	3%	2%	0%	1%	1%	0%	0%	1%	0%	4%	2%	0

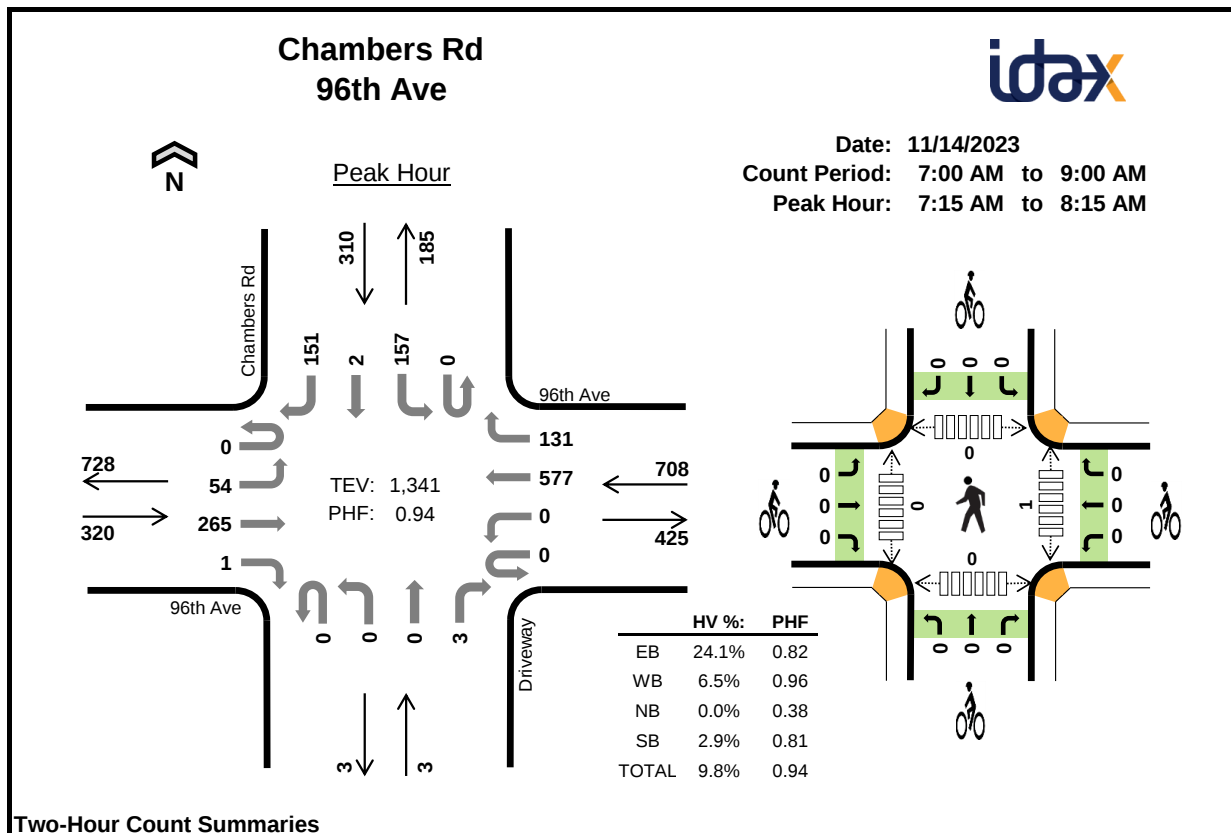
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	4	11	0	1	16	0	0	0	0	0	0	0	3	0	3
4:15 PM	5	8	0	1	14	0	0	0	0	0	2	0	0	0	2
4:30 PM	2	8	1	1	12	1	0	0	0	1	0	0	3	0	3
4:45 PM	1	10	1	3	15	0	1	0	0	1	3	3	4	0	10
5:00 PM	5	7	2	2	16	0	0	0	0	0	0	2	2	0	4
5:15 PM	5	9	5	3	22	0	0	0	0	0	2	0	3	0	5
5:30 PM	3	8	1	1	13	1	0	0	0	1	1	2	1	1	5
5:45 PM	3	12	1	1	17	0	0	0	0	0	0	0	0	0	0
Count Total	28	73	11	13	125	2	1	0	0	3	8	7	16	1	32
Peak Hour	13	33	4	7	57	1	1	0	0	2	5	5	9	0	19

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	104th Ave				104th Ave				Chambers Rd				Chambers Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	1	1	2	0	0	11	0	0	0	0	0	0	1	0	0	16	0
4:15 PM	0	0	5	0	0	2	4	2	0	0	0	0	0	1	0	0	14	0
4:30 PM	0	0	0	2	0	1	7	0	0	1	0	0	0	0	0	1	12	0
4:45 PM	0	1	0	0	0	0	9	1	0	0	1	0	0	0	0	3	15	57
5:00 PM	0	0	3	2	0	0	6	1	0	1	1	0	0	2	0	0	16	57
5:15 PM	0	0	3	2	0	0	8	1	0	1	4	0	0	1	2	0	22	65
5:30 PM	0	1	2	0	0	0	8	0	0	1	0	0	0	0	0	1	13	66
5:45 PM	0	0	3	0	0	1	9	2	0	0	0	1	0	0	0	1	17	68
Count Total	0	3	17	8	0	4	62	7	0	4	6	1	0	5	2	6	125	0
Peak Hour	0	1	8	4	0	3	26	4	0	2	2	0	0	3	0	4	57	0

Two-Hour Count Summaries - Bikes																		
Interval Start	104th Ave			104th Ave			Chambers Rd			Chambers Rd			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	0				
4:45 PM	0	0	0	0	1	0	0	0	0	0	0	0	1	2				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2				
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2				
5:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	2				
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
Count Total	0	2	0	0	1	0	0	0	0	0	0	0	3	0				
Peak Hour	0	1	0	0	1	0	0	0	0	0	0	0	2	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

**Two-Hour Count Summaries**

Interval Start		96th Ave				96th Ave				Driveway				Chambers Rd				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM		0	7	46	0	0	0	151	26	0	0	0	0	0	45	0	45	320	0
7:15 AM		0	12	59	0	0	0	134	29	0	0	0	0	0	41	0	25	300	0
7:30 AM		0	14	83	1	0	0	154	29	0	0	0	1	0	39	1	36	358	0
7:45 AM		0	17	65	0	0	0	144	34	0	0	0	0	0	48	0	48	356	1,334
8:00 AM		0	11	58	0	0	0	145	39	0	0	0	2	0	29	1	42	327	1,341
8:15 AM		0	11	76	1	0	1	116	21	0	0	0	0	0	33	0	26	285	1,326
8:30 AM		0	17	71	0	0	0	102	26	0	0	0	0	0	25	0	16	257	1,225
8:45 AM		0	10	75	0	0	0	84	16	0	0	0	0	0	24	0	13	222	1,091
Count Total		0	99	533	2	0	1	1,030	220	0	0	0	3	0	284	2	251	2,425	0
Peak Hour	All	0	54	265	1	0	0	577	131	0	0	0	3	0	157	2	151	1,341	0
	HV	0	3	74	0	0	0	40	6	0	0	0	0	0	6	0	3	132	0
	HV%	-	6%	28%	0%	-	-	7%	5%	-	-	-	0%	-	4%	0%	2%	10%	0

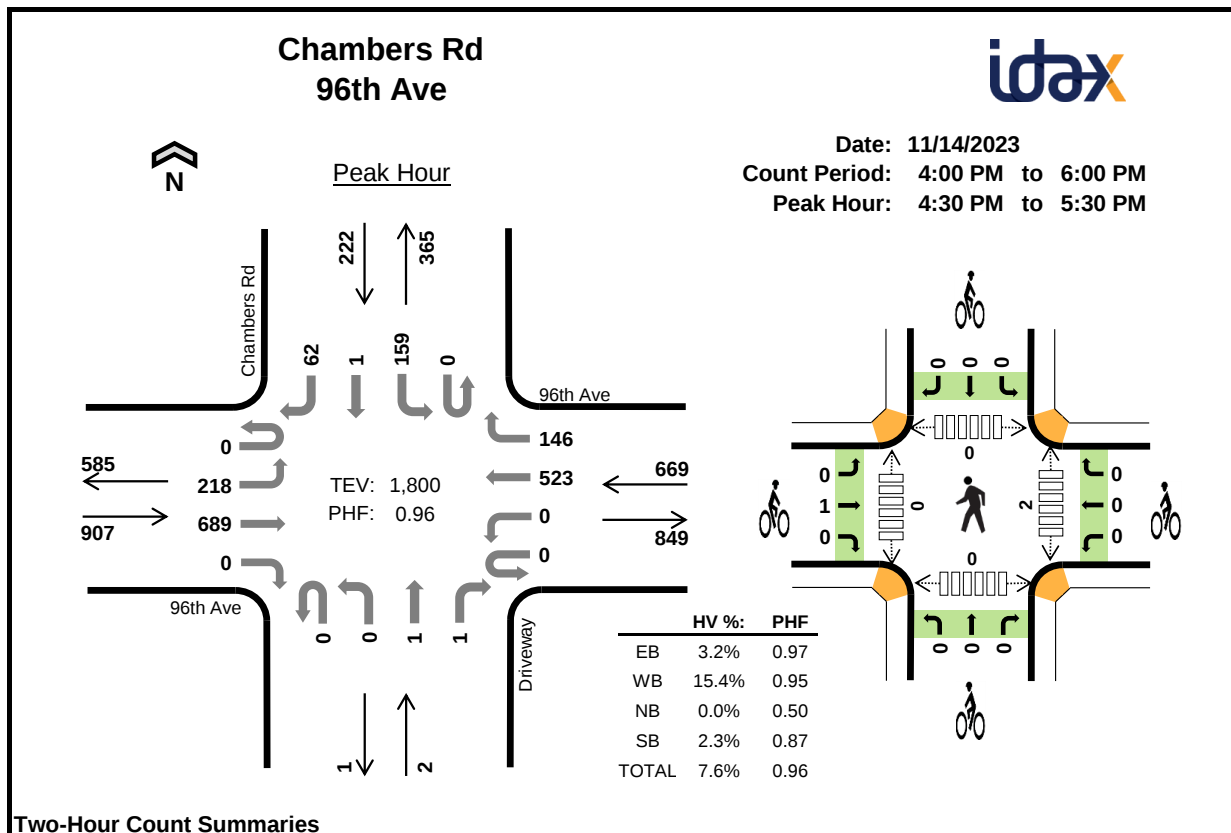
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	25	12	0	3	40	0	0	0	0	0	0	0	0	0	0
7:15 AM	11	6	0	1	18	0	0	0	0	0	0	0	0	0	0
7:30 AM	25	14	0	0	39	0	0	0	0	0	0	0	0	0	0
7:45 AM	23	13	0	4	40	0	0	0	0	0	1	0	0	0	1
8:00 AM	18	13	0	4	35	0	0	0	0	0	0	0	0	0	0
8:15 AM	13	19	0	1	33	0	0	0	0	0	0	0	0	0	0
8:30 AM	18	16	0	0	34	0	0	0	0	0	0	0	0	0	0
8:45 AM	20	11	0	1	32	0	0	0	0	0	0	0	0	0	0
Count Total	153	104	0	14	271	0	0	0	0	0	1	0	0	0	1
Peak Hour	77	46	0	9	132	0	0	0	0	0	1	0	0	0	1

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	96th Ave				96th Ave				Driveway				Chambers Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	1	24	0	0	0	11	1	0	0	0	0	0	2	0	1	40	0
7:15 AM	0	1	10	0	0	0	6	0	0	0	0	0	0	1	0	0	18	0
7:30 AM	0	1	24	0	0	0	12	2	0	0	0	0	0	0	0	0	39	0
7:45 AM	0	1	22	0	0	0	12	1	0	0	0	0	0	2	0	2	40	137
8:00 AM	0	0	18	0	0	0	10	3	0	0	0	0	0	3	0	1	35	132
8:15 AM	0	0	13	0	0	0	18	1	0	0	0	0	0	0	0	1	33	147
8:30 AM	0	1	17	0	0	0	16	0	0	0	0	0	0	0	0	0	34	142
8:45 AM	0	0	20	0	0	0	9	2	0	0	0	0	0	1	0	0	32	134
Count Total	0	5	148	0	0	0	94	10	0	0	0	0	0	9	0	5	271	0
Peak Hour	0	3	74	0	0	0	40	6	0	0	0	0	0	6	0	3	132	0

Two-Hour Count Summaries - Bikes																	
Interval Start	96th Ave			96th Ave			Driveway			Chambers Rd			15-min Total	Rolling One Hour			
	Eastbound			Westbound			Northbound			Southbound							
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT					
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Peak Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

**Two-Hour Count Summaries**

Interval Start		96th Ave				96th Ave				Driveway				Chambers Rd				15-min Total	Rolling One Hour
		Eastbound				Westbound				Northbound				Southbound					
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
	4:00 PM	0	52	128	0	0	0	101	33	0	0	0	0	0	31	0	10	355	0
	4:15 PM	0	54	149	0	0	0	121	34	0	0	0	0	0	24	0	18	400	0
	4:30 PM	0	59	158	0	0	0	138	38	0	0	1	0	0	34	0	13	441	0
	4:45 PM	0	59	173	0	0	0	130	44	0	0	0	0	0	47	0	17	470	1,666
	5:00 PM	0	49	185	0	0	0	138	31	0	0	0	0	0	39	0	15	457	1,768
	5:15 PM	0	51	173	0	0	0	117	33	0	0	0	1	0	39	1	17	432	1,800
	5:30 PM	0	46	160	0	0	0	105	42	0	0	0	0	0	30	0	12	395	1,754
	5:45 PM	0	41	158	1	0	0	95	48	0	0	0	1	0	29	0	17	390	1,674
Count Total		0	411	1,284	1	0	0	945	303	0	0	1	2	0	273	1	119	3,340	0
Peak Hour	All	0	218	689	0	0	0	523	146	0	0	1	1	0	159	1	62	1,800	0
	HV	0	1	28	0	0	0	102	1	0	0	0	0	0	4	0	1	137	0
	HV%	-	0%	4%	-	-	-	20%	1%	-	-	0%	0%	-	3%	0%	2%	8%	0

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	8	26	0	0	34	0	0	0	0	0	0	0	0	0	0
4:15 PM	5	32	0	1	38	0	0	0	0	0	0	0	0	0	0
4:30 PM	9	31	0	2	42	0	0	0	0	0	1	0	0	0	1
4:45 PM	9	24	0	1	34	1	0	0	0	1	0	0	0	0	0
5:00 PM	7	33	0	1	41	0	0	0	0	0	1	0	0	0	1
5:15 PM	4	15	0	1	20	0	0	0	0	0	0	0	0	0	0
5:30 PM	4	19	0	2	25	0	0	0	0	0	0	0	0	0	0
5:45 PM	7	20	0	1	28	0	0	0	0	0	1	0	0	1	2
Count Total	53	200	0	9	262	1	0	0	0	1	3	0	0	1	4
Peak Hour	29	103	0	5	137	1	0	0	0	1	2	0	0	0	2

Two-Hour Count Summaries - Heavy Vehicles																		
Interval Start	96th Ave				96th Ave				Driveway				Chambers Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	8	0	0	0	24	2	0	0	0	0	0	0	0	0	34	0
4:15 PM	0	0	5	0	0	0	32	0	0	0	0	0	0	0	0	1	38	0
4:30 PM	0	1	8	0	0	0	31	0	0	0	0	0	0	0	2	0	42	0
4:45 PM	0	0	9	0	0	0	24	0	0	0	0	0	0	0	1	0	34	148
5:00 PM	0	0	7	0	0	0	32	1	0	0	0	0	0	0	1	0	41	155
5:15 PM	0	0	4	0	0	0	15	0	0	0	0	0	0	0	0	1	20	137
5:30 PM	0	0	4	0	0	0	18	1	0	0	0	0	0	0	1	0	25	120
5:45 PM	0	0	7	0	0	0	20	0	0	0	0	0	0	0	0	1	28	114
Count Total	0	1	52	0	0	0	196	4	0	0	0	0	0	5	0	4	262	0
Peak Hour	0	1	28	0	0	0	102	1	0	0	0	0	0	4	0	1	137	0

Two-Hour Count Summaries - Bikes																		
Interval Start	96th Ave			96th Ave			Driveway			Chambers Rd			15-min Total	Rolling One Hour				
	Eastbound			Westbound			Northbound			Southbound								
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT						
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	1				
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Count Total	0	1	0	0	0	0	0	0	0	0	0	0	1	0				
Peak Hour	0	1	0	0	0	0	0	0	0	0	0	0	1	0				

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Location: Chambers Rd N/O 101st Ave
Date Range: 11/14/2023 - 11/20/2023
Site Code: 01

Time	Tuesday 11/14/2023			Wednesday 11/15/2023			Thursday 11/16/2023			Friday 11/17/2023			Saturday 11/18/2023			Sunday 11/19/2023			Monday 11/20/2023			Mid-Week Average		
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	17	13	30	9	11	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	12	25
1:00 AM	10	14	24	11	12	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	13	24
2:00 AM	8	8	16	6	7	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	8	15
3:00 AM	15	15	30	13	14	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	15	29
4:00 AM	35	27	62	24	24	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	26	55
5:00 AM	68	59	127	78	48	126	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73	54	127
6:00 AM	170	192	362	194	220	414	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	182	206	388
7:00 AM	411	364	775	382	356	738	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	397	360	757
8:00 AM	276	293	569	273	285	558	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275	289	564
9:00 AM	179	144	323	189	152	341	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	184	148	332
10:00 AM	166	148	314	170	164	334	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	156	324
11:00 AM	196	170	366	193	194	387	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	195	182	377
12:00 PM	204	231	435	240	229	469	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	222	230	452
1:00 PM	181	184	365	193	182	375	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	187	183	370
2:00 PM	262	203	465	230	244	474	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	246	224	470
3:00 PM	378	369	747	419	375	794	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	399	372	771
4:00 PM	499	433	932	479	405	884	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	489	419	908
5:00 PM	393	431	824	426	426	852	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	410	429	838
6:00 PM	276	280	556	281	299	580	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	279	290	568
7:00 PM	157	245	402	169	220	389	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	163	233	396
8:00 PM	105	132	237	114	169	283	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110	151	260
9:00 PM	85	117	202	86	122	208	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	86	120	205
10:00 PM	37	55	92	52	75	127	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45	65	110
11:00 PM	18	35	53	25	37	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	36	58
Total	4,146	4,162	8,308	4,256	4,270	8,526	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,201	4,216	8,417
Percent	50%	50%		50%	50%		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50%	50%	
AM Peak	07:00	07:00	07:00	07:00	07:00	07:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	07:00	07:00	07:00
Vol.	411	364	775	382	356	738	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	397	360	757
PM Peak	16:00	16:00	16:00	16:00	17:00	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16:00	17:00	16:00
Vol.	499	433	932	479	426	884	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	489	429	908

1. Mid-week average includes data between Tuesday and Thursday.