

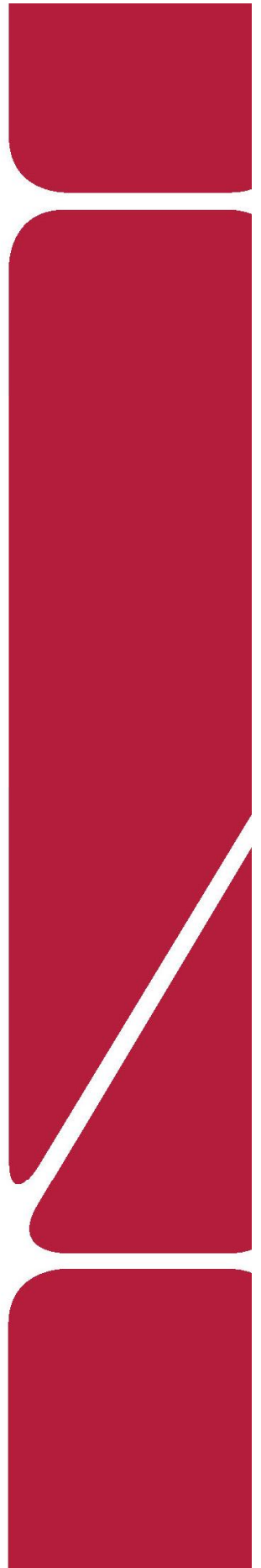


Traffic Impact Study

100th and Havana Commerce City, Colorado

Prepared for:
Scannell Properties, LLC

Kimley»Horn



T R A F F I C I M P A C T S T U D Y

100th and Havana

Commerce City, Colorado

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1.0 EXECUTIVE SUMMARY

An industrial project named 100th and Havana is proposed to be located along the east side of Havana Street between 102nd Avenue and Heinz Way in Commerce City, Colorado. The project is anticipated to consist of three (3) industrial warehouse buildings totaling approximately 302,500 square feet. It is expected that the project would be completed by the end of 2022. Analysis was therefore completed for the 2022 short term and 2040 long term horizons per City of Commerce City and State of Colorado Department of Transportation (CDOT) requirements.

The purpose of this study is to identify project traffic generation characteristics, to identify potential project traffic related impacts on the local street system, and to develop mitigation measures required for identified impacts. The following intersections were incorporated into this traffic study:

- 104th Avenue (SH-44) and Joliet Street
- 96th Avenue and Havana Street
- 96th Avenue and State Highway 2 (SH-2)

In addition, a northern right-in/right-out access and a southern full movement access along Havana Street were also included for evaluation.

Regional access to the project will be provided by US-85, Interstate 76, and E-470. Primary access will be provided by 104th Avenue, Havana Street, and 96th Avenue. Direct access to the site will be provided by one right-in/right-out access and a full movement access along Havana Street. The north project access along Havana Street is proposed to be a right-in/right-out access located approximately 3,700 feet south of the 104th Avenue/Joliet Street Intersection. The south project access along Havana Street is proposed to be a full movement access located approximately 4,100 feet south of the 104th Avenue/Joliet Street intersection.

100th and Havana is expected to generate approximately 1,020 weekday daily trips. Of these, 121 trips are expected to occur during both the morning and afternoon peak hours.

Distribution of project traffic on the street system was based on the area street system characteristics, existing traffic patterns and volumes, demographic information, and the

proposed access system for the project. Assignment of project traffic was based upon the trip generation described previously and the distributions developed.

Based on the analysis presented in this report, Kimley-Horn believes the 100th and Havana project proposed on the east side of Havana Street between 102nd Avenue and Heinz Way will be successfully incorporated into the existing and future roadway network. The proposed project development resulted in the following recommendations and conclusions:

2022 Buildout Improvement Recommendations

- The threshold for requiring access permits along CDOT roadways occurs when project traffic is anticipated to increase the existing access traffic volumes by more than 20 percent. Both SH-2 and 104th Avenue (SH-44) exist within the project study area and are CDOT roadways. Based on projections, the addition of 100th and Havana project traffic at the intersections of 96th Avenue/SH-2 and 104th Avenue (SH-44)/Joliet Street does not increase traffic volumes by more than 20 percent over existing; therefore, access permits are not anticipated to be required for these intersections.
- Direct access to the site is proposed to be one northern right-in/right-out access and one southern full movement access along Havana Street, approximately 3,700 feet and 4,100 feet (measured center to center) south of the 104th Avenue/Joliet Street intersection, respectively. It is recommended that the exiting access approaches at both accesses to Havana Street be stop controlled with the installation of R1-1 "STOP" signs. One vehicle of storage, 25 feet for passenger cars or 50 feet for trucks, of throat depth is recommended to be provided for the project accesses based on vehicle usage anticipated.
- To restrict the northern access to right turn movements only, it is recommended that a R3-5(R) Right Turn Only sign be installed underneath the STOP sign. Likewise, a R3-2 No Left Turn sign should be installed on the southeast corner of the access intersection visible to southbound drivers along Havana Street.
- Per City of Commerce City Standards, it is recommended that a 140-foot southbound left turn lane with a 175-foot taper be constructed at the southern full movement project access along Havana Street. Construction of this southbound left turn lane will require the through

lanes along Havana Street to be transitioned around this left turn lane at a taper rate of approximately 20.5 to 1 (based on $L = (W \cdot S^2)/60$). These through lane transitions will be planned and designed so that the bridge over the ditch to the north is not impacted. Likewise, a northbound right turn lane of 90 feet with a 175-foot taper is warranted based on City standards for the southern access.

- With construction of the project, the City of Commerce City is requiring build out of the eastern half of Havana Street to the ultimate cross section along project frontage. Havana Street is classified as a Major Collector roadway; therefore, the widening is anticipated to consist of 12 additional feet with a 6-foot designated bicycle lane. To accommodate this roadway widening, an additional 13 feet of right-of-way will be dedicated along Havana Street.

2040 Long-Term Improvement Recommendations

- By 2040, the intersection of 96th Avenue and SH-2 may operate unacceptably during the morning peak hour with or without the addition of project traffic if future traffic volume projections are realized. In order for this intersection to operate acceptably at LOS D, an additional westbound left turn lane may need to be constructed for dual left turn lanes to operate with protected only phasing. Also, the northbound right turn lane may need to be extended from 275 feet to 300 feet and the northbound right turn movement may need to operate with protected overlap phasing. Of note, none of these improvements and movements are anticipated to include traffic from this project.

General Improvements

- All on-site improvements should be incorporated into the Civil Drawings and conform to standards of the City of Commerce City, The Colorado Department of Transportation (CDOT), and the Manual on Uniform Traffic Control Devices (MUTCD) – 2009 Edition.

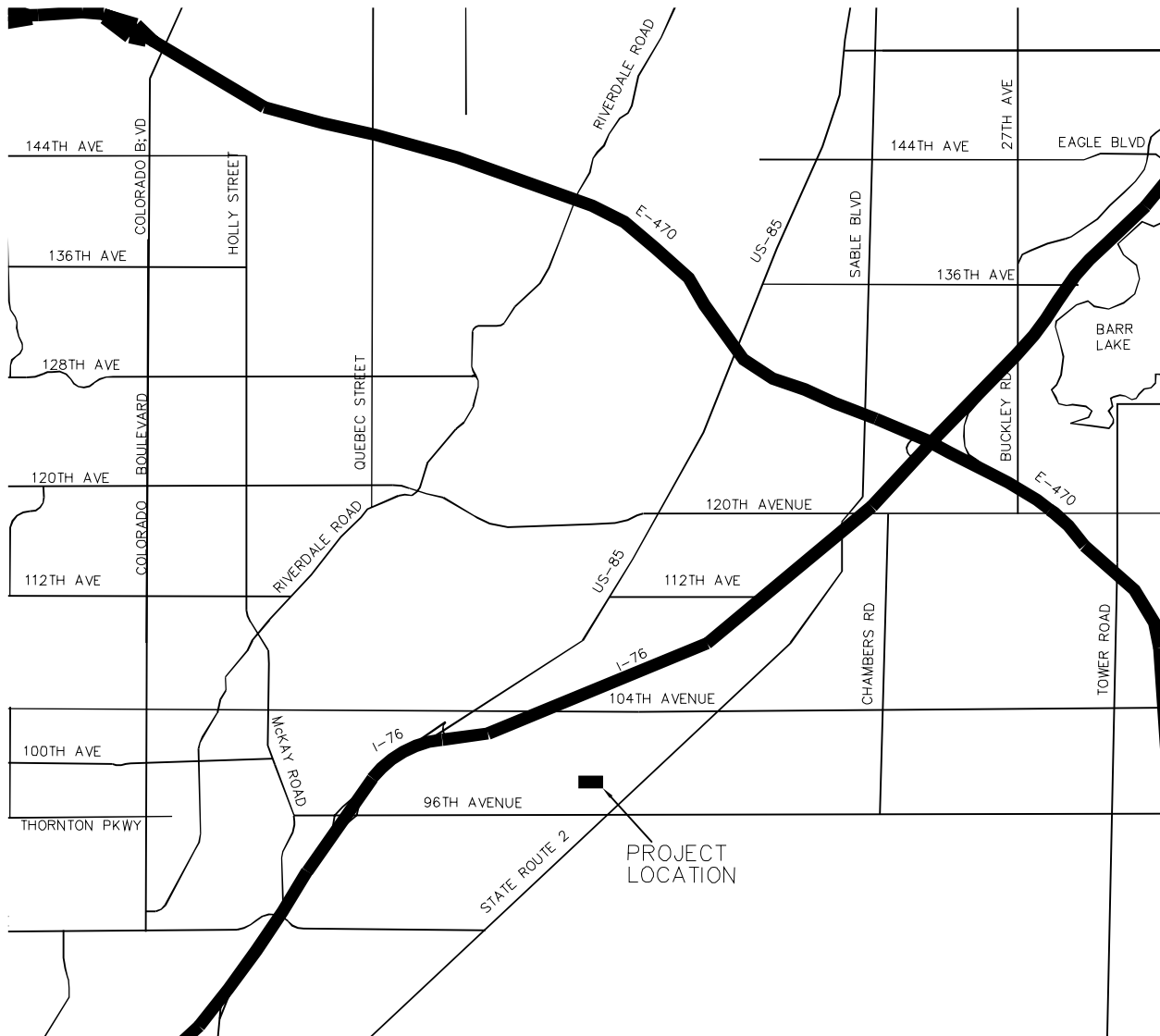
2.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this report to document the results of a Traffic Impact Study of future traffic conditions associated with the 100th and Havana project proposed to be located along the east side of Havana Street between 102nd Avenue and Heinz Way in Commerce City, Colorado. The vicinity map illustrating the project site location is shown in **Figure 1**. The project is proposed to be located on approximately 26.6 acres of vacant land. The development is anticipated to include three (3) industrial warehouse buildings totaling approximately 302,500 square feet. A conceptual site plan illustrating the project and access locations is shown in **Appendix F**. It is expected that the project will be completed by the end of 2022. Analysis was therefore completed for the 2022 short term and 2040 long term horizons per City of Commerce City and State of Colorado Department of Transportation (CDOT) requirements.

The purpose of this study is to identify project traffic generation characteristics, to identify potential project traffic related impacts on the local street system, and to develop mitigation measures required for identified impacts. The following intersections were incorporated into this traffic study:

- 104th Avenue (SH-44) and Joliet Street
- 96th Avenue and Havana Street
- 96th Avenue and State Highway 2 (SH-2)

In addition, two accesses along Havana Street were also included for evaluation. The north project access along Havana Street is proposed to be a right-in/right-out access located approximately 3,700 feet south of the 104th Avenue/Joliet Street Intersection. The south project access along Havana Street is proposed to be a full movement access located approximately 4,100 feet south of the 104th Avenue/Joliet Street intersection.



100TH AND HAVANA
 COMMERCE CITY, CO
 VICINITY MAP

FIGURE 1

3.0 EXISTING AND FUTURE CONDITIONS

3.1 Existing Study Area

The existing site is located on vacant land east of Havana Street. North of the project site is agricultural land and an irrigation ditch. This irrigation ditch also parallels Havana Street along the west side of the roadway across from the project site. To the south and west of the site, there are industrial areas with various facilities. To the east of the project site there is vacant land and a residential development to the southeast across SH-2. The surrounding area within the site study area is shown within the aerial of **Figure 2**.

3.2 Existing Roadway Network

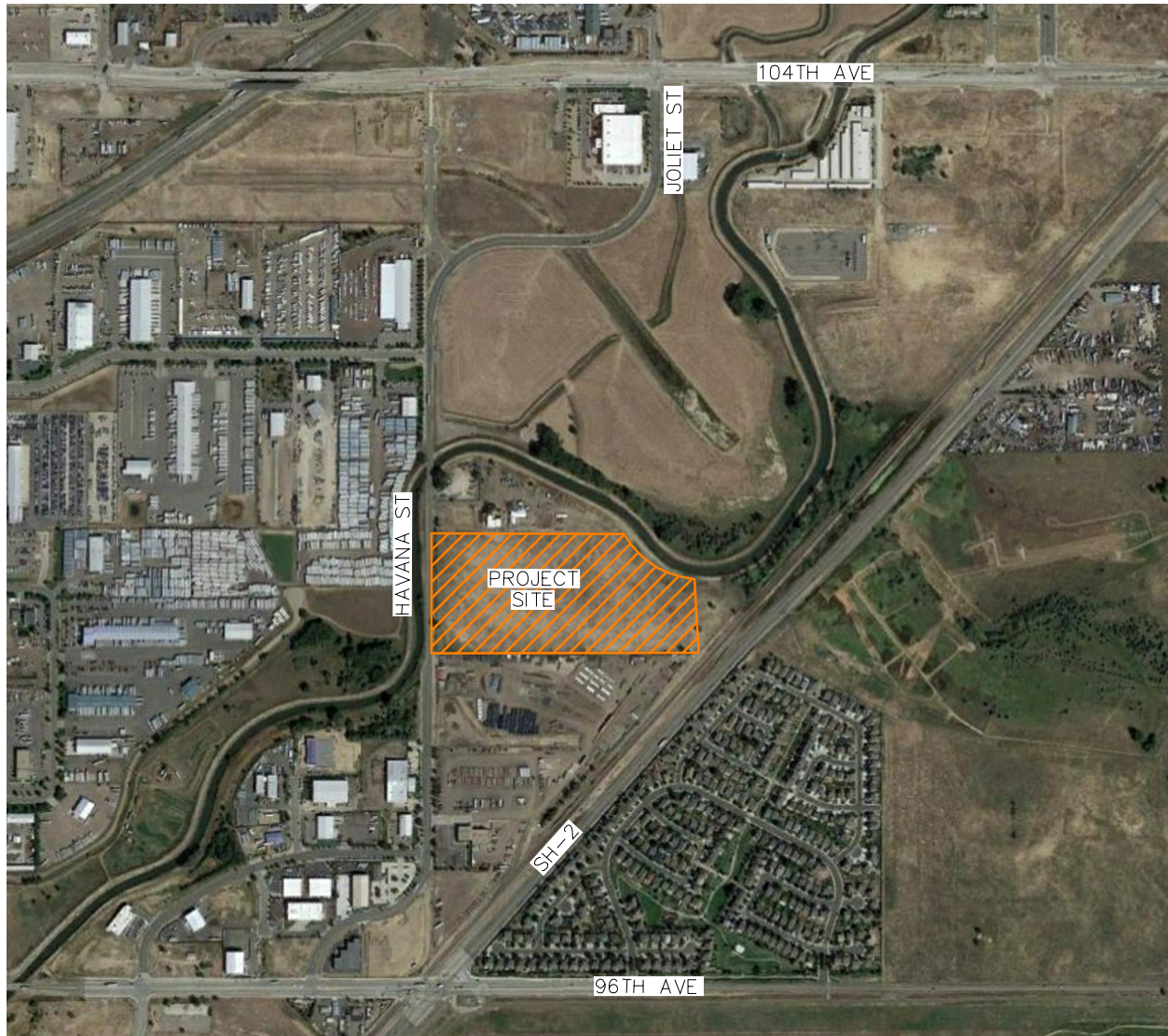
Regional access to the project will be provided by US-85, Interstate 76, and E-470. Primary access will be provided by 104th Avenue, Havana Street, and 96th Avenue.

104th Avenue (SH-44) is a raised median divided roadway providing two through lanes in each direction eastbound and westbound with a posted speed limit of 45 miles per hour through the study intersection with Joliet Street.

Havana Street is classified as a Major Collector. It presently provides one lane of travel each direction, northbound and southbound, with a 35 mile per hour posted speed limit within the study area.

96th Avenue is a raised median divided roadway providing two through lanes in each direction eastbound and westbound with a posted speed limit of 40 miles per hour through the study intersection with Havana Street.

SH-2 is a divided roadway providing two through lanes in each direction northbound and southbound with a posted speed limit of 45 miles per hour through the study intersection with 96th Avenue.



100TH AND HAVANA
COMMERCE CITY, CO
SITE AREA

FIGURE 2

The existing intersection of 104th Avenue and Joliet Street is signalized with protected/permissive phasing on all left turns. The eastbound approach consists of an exclusive left turn lane, two through lanes, and one right turn lane. The westbound approach consists of an exclusive left turn lane and two through lanes with the outside through lane being a shared through/right turn lane. The northbound approach consists of an exclusive left turn lane, one through lane, and one right turn lane. The southbound approach consists of an exclusive left turn lane and a shared through/right turn lane.

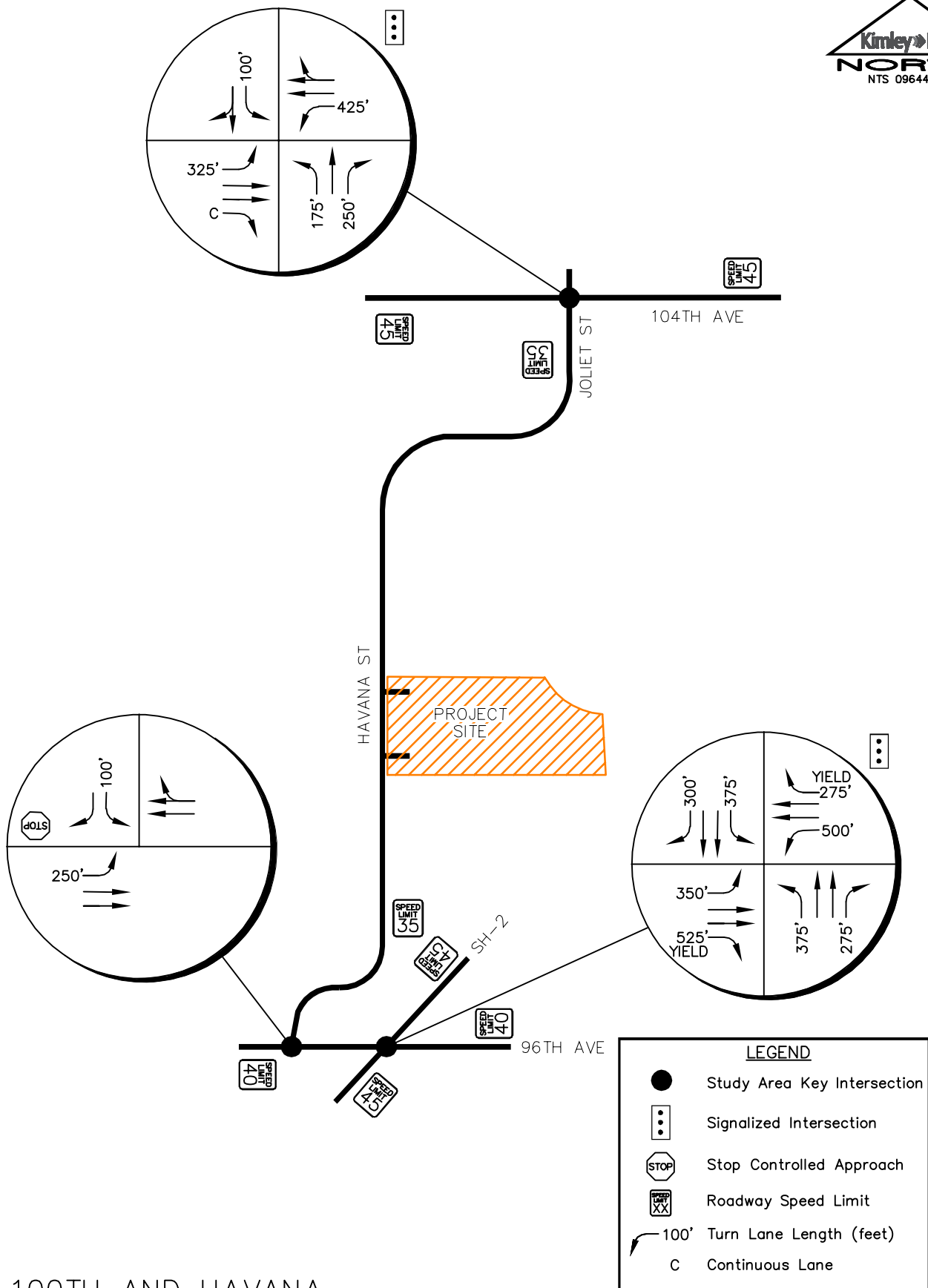
The 96th Avenue and Havana Street intersection is an unsignalized T-intersection with stop control on the southbound Havana Street approach. The eastbound approach consists of an exclusive left turn lane and two through lanes. The westbound approach consists of a through lane and a shared through/right turn lane. The southbound approach consists of separate left turn and right turn lanes.

The existing intersection of 96th Avenue and SH-2 is signalized with protected/permitted left turn phasing on all four approaches. All approaches consist of an exclusive left turn lane, two through lanes, and an exclusive right turn lane.

The Colorado Department of Transportation (CDOT) categorizes 104th Avenue (SH-44) through the study area as NR-B: Non-Rural Arterial. Commerce City categorizes 104th Avenue as a principal arterial roadway, Havana Street as a major collector, and 96th Avenue as a minor arterial as identified within the Commerce City Comprehensive Transportation Plan. The intersection lane configuration and control for the study area intersections are shown in **Figure 3**.

3.3 Existing Traffic Volumes

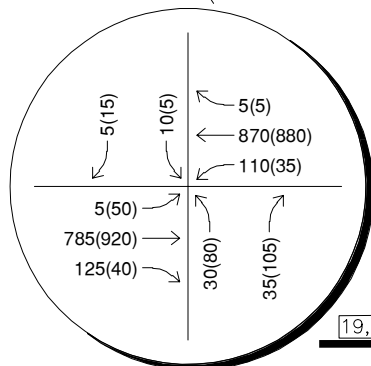
Existing peak hour turning movement counts were conducted at the study intersections on Tuesday, September 17, 2019 at the key intersections. The counts were conducted during the morning and afternoon peak hours of adjacent street traffic in 15-minute intervals from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. These counts were adjusted to 2020 volumes using a 1.44 percent annual growth in order to incorporate the signal that was installed at the intersection of 104th Avenue and Joliet Street in mid-2020. The 2020 turning movement volumes are shown in **Figure 4** with count sheets provided in **Appendix A**.



100TH AND HAVANA
COMMERCE CITY, CO
2020 EXISTING LANE CONFIGURATIONS

FIGURE 3

Adjusted from counts on
Tuesday, September 17, 2019
7:15 to 8:15 AM (4:30 to 5:30 PM)



19,900

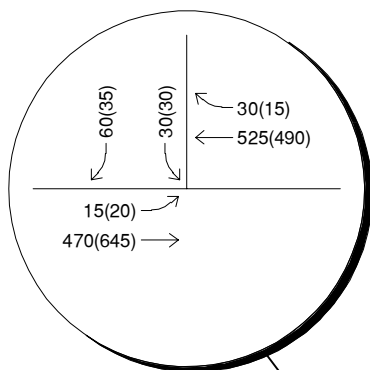
750

104TH AVE

19,500

JOLIET ST

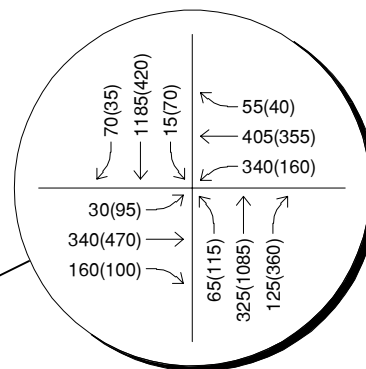
Adjusted from counts on
Tuesday, September 17, 2019
7:00 to 8:00 AM (4:30 to 5:30 PM)



HAVANA ST

PROJECT SITE

Adjusted from counts on
Tuesday, September 17, 2019
7:00 to 8:00 AM (4:30 to 5:30 PM)



11,900

17,500

SH-2

14,600

96TH AVE

22,400

LEGEND

- Study Area Key Intersection
- XXX(XXX) Weekday AM(PM)
Peak Hour Traffic Volumes
- XX,X00 Estimated Daily Traffic Volume

100TH AND HAVANA
COMMERCE CITY, CO
2020 EXISTING TRAFFIC VOLUMES

FIGURE 4



3.4 Unspecified Development Traffic Growth

According to information provided on the website for the Colorado Department of Transportation (CDOT), the 20-year growth factor along 104th Avenue (SH-44) in the vicinity of the site is 1.37. This equates to an annual growth rate of approximately 1.44 percent. Traffic information from the CDOT Online Transportation Information System (OTIS) website is included in **Appendix B**. This annual growth rate was used to estimate near term 2022 and long term 2040 traffic volume projections at the key intersections. Background traffic volumes for 2022 are shown in **Figure 5**. Background traffic volumes for 2040 are shown in **Figure 6**.

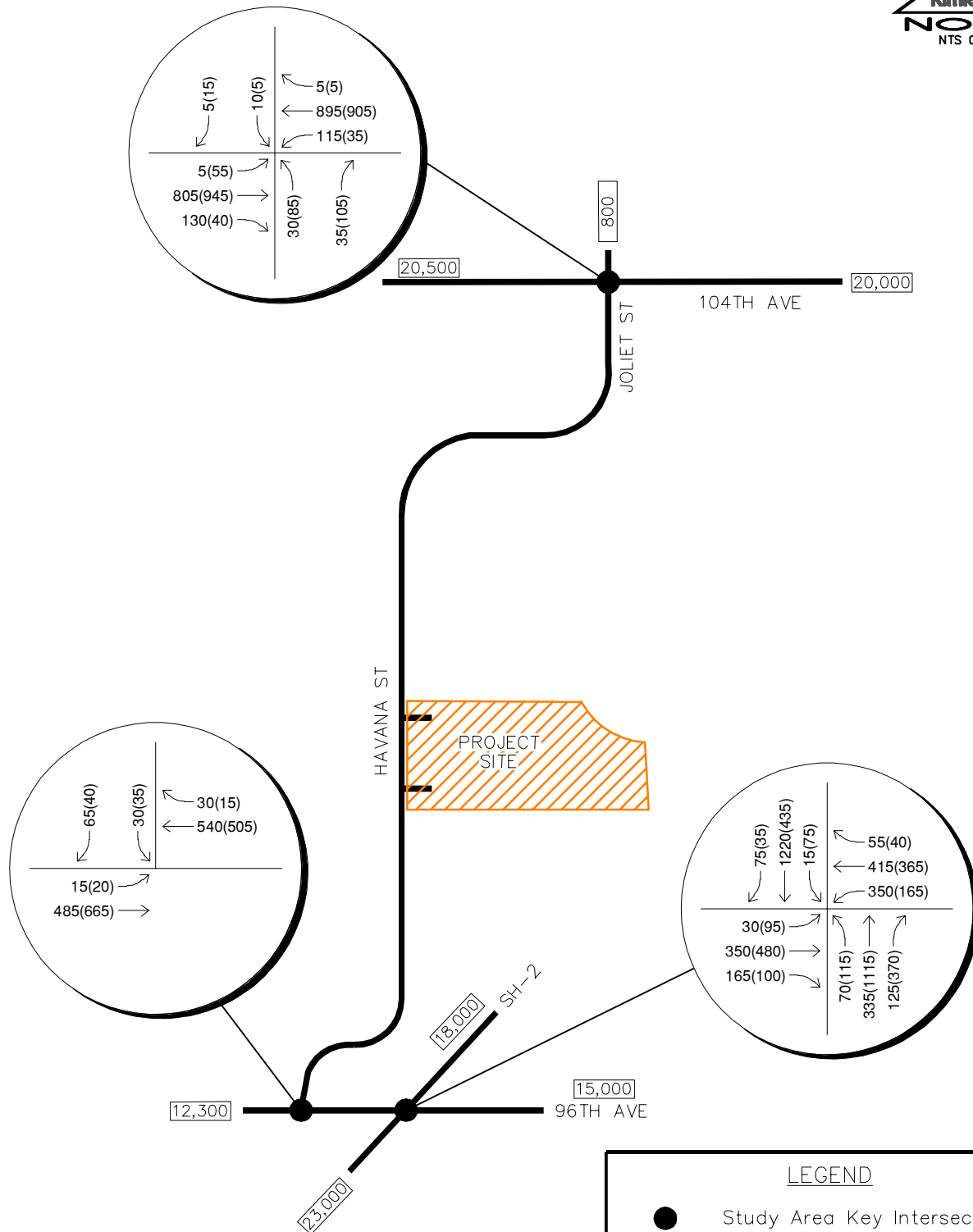
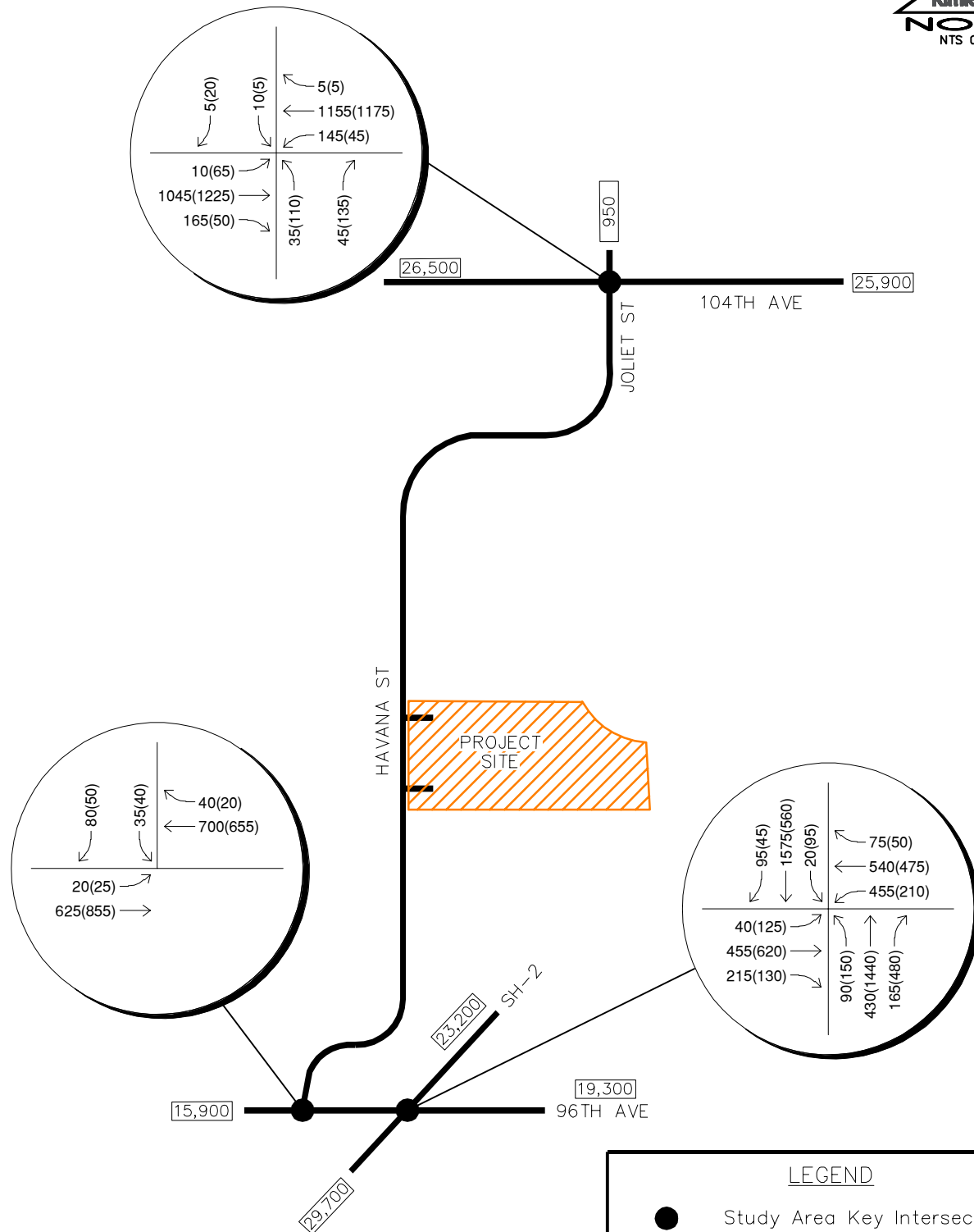


FIGURE 5



LEGEND

- Study Area Key Intersection
- XXX(XXX) Weekday AM(PM)
Peak Hour Traffic Volumes
- XX,X00 Estimated Daily Traffic Volume

FIGURE 6

4.0 PROJECT TRAFFIC CHARACTERISTICS

4.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land uses to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Manual*¹ published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. For this study, Kimley-Horn used the ITE Trip Generation Report average rate equation that applies to the Industrial Park use (ITE Code 130) for traffic associated with the development.

The 100th and Havana project is expected to generate approximately 1,020 daily weekday trips, with 121 of trips occurring during both the morning and afternoon peak hours. Calculations were based on the procedure and information provided in the ITE *Trip Generation Manual, 10th Edition – Volume 1: User's Guide and Handbook*, 2017. **Table 1** summarizes the estimated trip generation for the proposed development. The trip generation worksheets are included in **Appendix C**.

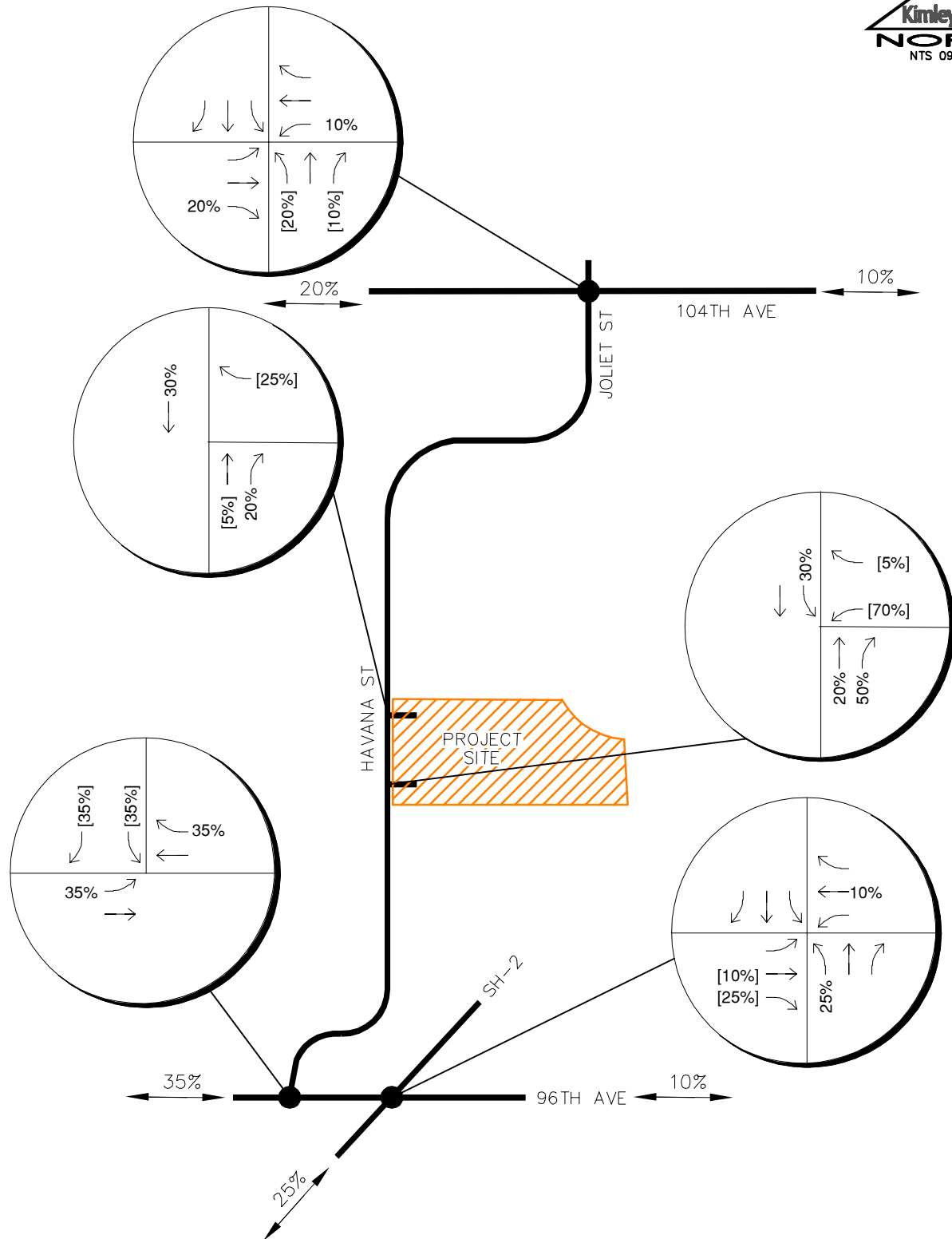
Table 1 – 100th and Havana Traffic Generation

Land Use	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Industrial Park (ITE130) – 302,500 Square Feet	1,020	98	23	121	25	96	121

4.2 Trip Distribution

Distribution of site traffic was based on the area street system characteristics, existing traffic patterns and volumes, existing demographic information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The project trip distribution is illustrated in **Figure 7**.

¹ Institute of Transportation Engineers, *Trip Generation Manual*, Tenth Edition, Washington DC, 2017.



LEGEND

● Study Area Key Intersection

XX%[XX%] Entering[Exiting] Trip Distribution Percentage

100TH AND HAVANA
 COMMERCE CITY, CO
 PROJECT TRIP DISTRIBUTION

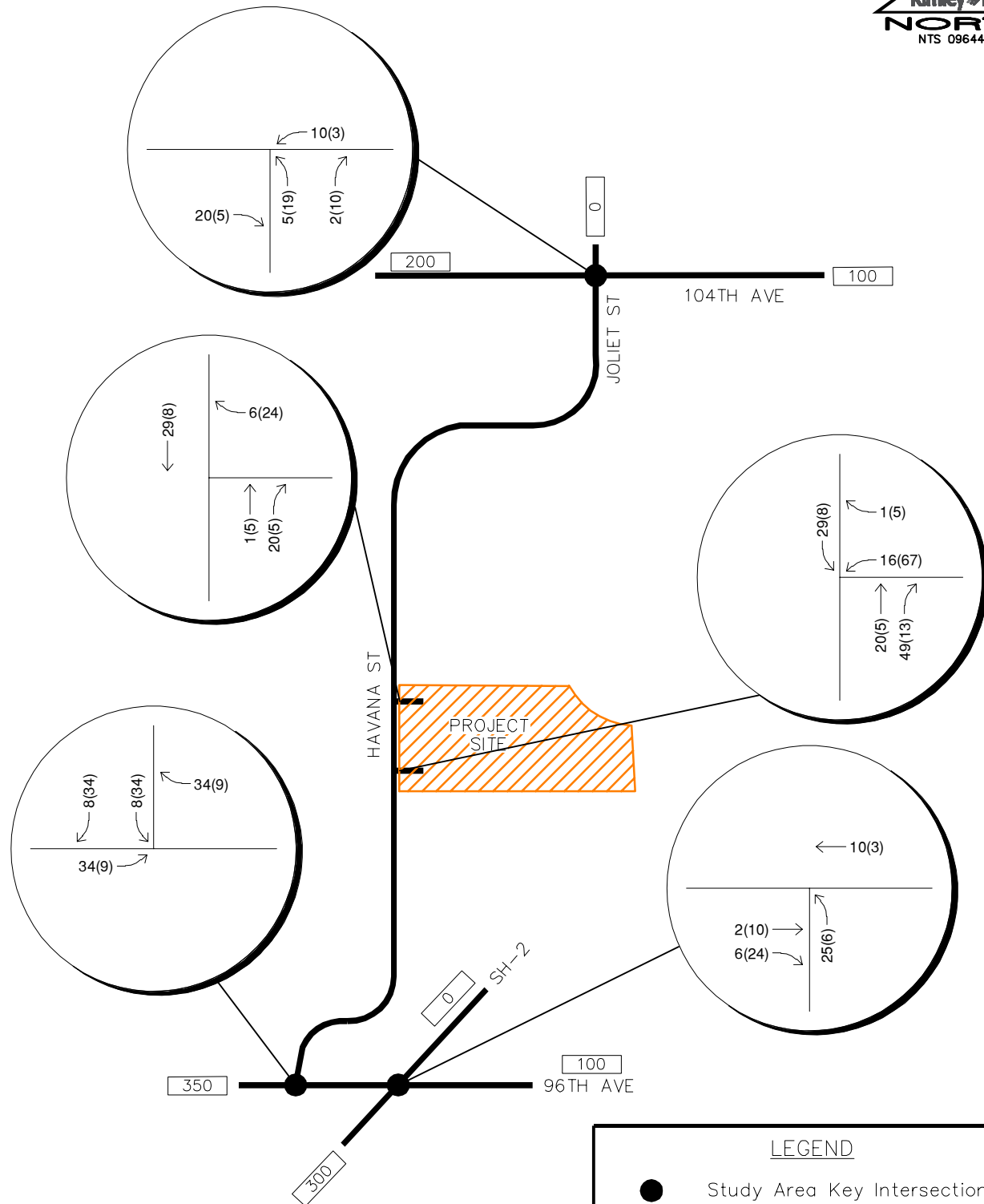
FIGURE 7

4.3 Traffic Assignment

Project traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Project traffic assignment for 100th and Havana is shown in **Figure 8**.

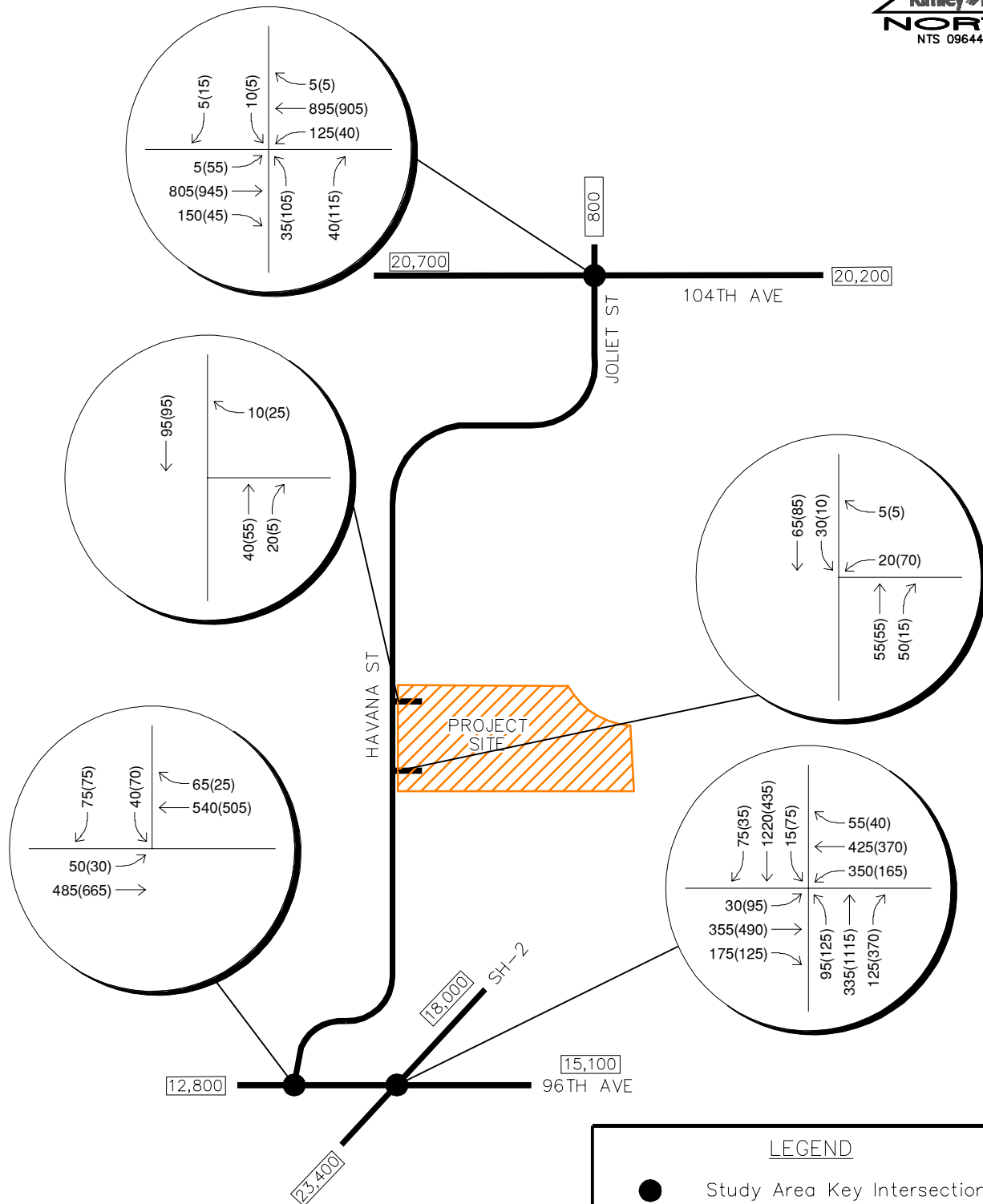
4.4 Total (Background Plus Project) Traffic

Site traffic volumes were added to the background volumes to represent estimated traffic conditions for the short term 2022 horizon and long term 2040 horizon. These total traffic volumes for the site are illustrated for the 2022 and 2040 horizon years in **Figures 9** and **10**, respectively.



100TH AND HAVANA
 COMMERCE CITY, CO
 PROJECT TRAFFIC ASSIGNMENT

FIGURE 8



LEGEND

- Study Area Key Intersection
- XXX(XXX) Weekday AM(PM) Peak Hour Traffic Volumes
- XX,X00 Estimated Daily Traffic Volume

100TH AND HAVANA
COMMERCE CITY, CO
2022 TOTAL TRAFFIC VOLUMES

FIGURE 9

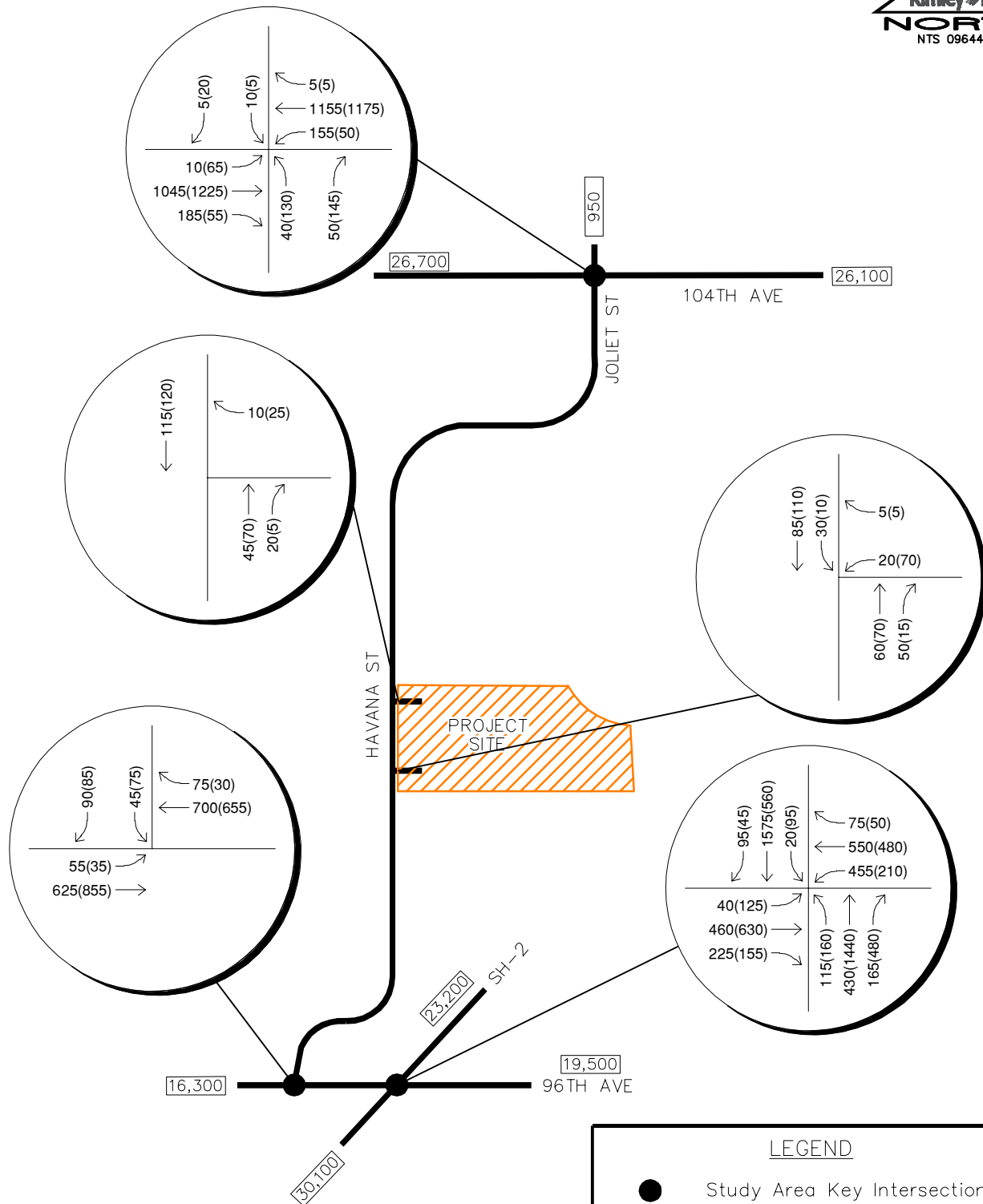


FIGURE 10

5.0 TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn's analysis of traffic operations in the site vicinity was conducted to determine potential capacity deficiencies in the 2022 and 2040 development horizons at the identified key intersections and access driveways. The acknowledged source for determining overall capacity is the current edition of the *Highway Capacity Manual (HCM)*².

5.1 Analysis Methodology

Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). For intersections and roadways in this study area, standard traffic engineering practice identifies overall LOS D for signalized intersections and LOS E for movements and approaches of unsignalized intersections as the minimum threshold for acceptable operations. **Table 2** shows the definition of level of service for signalized and unsignalized intersections.

Table 2 – Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)	Unsignalized Intersection Average Total Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Definitions provided from the Highway Capacity Manual, Sixth Edition, Transportation Research Board, 2016.

Study area intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections. Under the unsignalized analysis, the level of service (LOS) for a two-way stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. Level of service for a two-way stop-controlled intersection is not defined for the intersection as a whole. Level of service for a signalized and four-way stop controlled intersection is defined for each approach and for the intersection.

² Transportation Research Board, *Highway Capacity Manual*, Sixth Edition, Washington DC, 2016.

5.2 Key Intersection Operational Analysis

Calculations for the level of service at the key intersections for the study area are provided in **Appendix D**. The existing year analysis is based on the lane geometry and intersection control shown in **Figure 3**. The signalized intersection analysis utilizes observed cycle lengths with existing phasing. Based on increased national attention given to allocating appropriate yellow and all-red clearance intervals to improve intersection safety, these have been calculated and are applied for the approaches to the signalized intersections. The increase in the yellow and all red time sacrifices intersection capacity for improved safety. Existing peak hour factors were used for the existing and 2022 conditions, and the recommended HCM urban area peak hour factor of 0.92 was used for the 2040 analysis. Synchro traffic analysis software was used to analyze the study area intersections and access drives for level of service. The Synchro Highway Capacity Manual (HCM) methodology reports were used to analyze intersection delay and level of service.

104th Avenue (SH-44) and Joliet Street

The existing intersection of 104th Avenue (SH-44) and Joliet Street is signalized with protected/permissive phasing on all the left turns. As such, this intersection is currently operating acceptably during morning and afternoon peak hours with LOS B. With the existing lane configuration and control, this intersection is anticipated to continue to operate acceptably with LOS B during the morning and afternoon peak hour with or without the addition of project traffic throughout the 2040 horizon. **Table 3** provides the results of the level of service at this intersection.

Table 3 – 104th Avenue and Joliet Street LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
2020 Existing	10.8	B	14.7	B
2022 Background	10.9	B	15.1	B
2022 Background Plus Project	11.2	B	16.1	B
2040 Background	11.1	B	17.4	B
2040 Background Plus Project	11.4	B	18.4	B

96th Avenue and Havana Street

The existing T-intersection of 96th Avenue and Havana Street is unsignalized with stop control on the southbound Havana Street approach. This intersection operates with an exclusive left turn lane and right turn lane on the southbound approach. With the existing lane configuration and control, as well as with the addition of project traffic, all movements at this intersection are expected to operate with acceptable level of service in the buildout year 2022 and the long term 2040 horizon. **Table 4** provides the results of the level of service at this intersection.

Table 4 – 96th Avenue and Havana Street LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
2020 Existing				
Eastbound Left	8.0	A	7.9	A
Southbound Approach	10.4	B	11.1	B
2022 Background				
Eastbound Left	8.1	A	7.9	A
Southbound Approach	10.5	B	11.3	B
2022 Background Plus Project				
Eastbound Left	8.4	A	8.0	A
Southbound Approach	11.2	B	12.3	B
2040 Background				
Eastbound Left	8.1	A	8.0	A
Southbound Approach	11.0	B	11.9	B
2040 Background Plus Project				
Eastbound Left	8.4	A	8.1	A
Southbound Approach	11.6	B	12.9	B

96th Avenue and SH-2

96th Avenue and SH-2 is a four-leg signalized intersection with an exclusive left turn lane, two through lanes, and an exclusive right turn lane on all four approaches. This intersection currently operates with LOS D during the morning peak hour and LOS C during the afternoon peak hour under the existing lane configuration and signal control. With or without the completion of the proposed development in 2022, the intersection is anticipated to operate acceptably with LOS D or better during both the morning and afternoon peak hours.

By 2040, the intersection of 96th Avenue and SH-2 may operate with long delays and unacceptable level of service if future traffic volume projections are realized. For this intersection to operate acceptably, an additional westbound left turn lane may need to be constructed for dual left turn lanes to operate with protected only phasing. The northbound right turn movement may need to operate with protected/overlap phasing. Likewise, a longer cycle length of 135 seconds (it operates with a 120-second cycle length today) would be beneficial during the morning peak hour. With the recommended improvements, this intersection is anticipated to operate at LOS D in the morning and afternoon peak hours with or without project traffic in 2040. **Table 5** provides the results of the level of service at this intersection.

Table 5 – 96th Avenue and SH-2 LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
2020 Existing	38.9	D	31.4	C
2022 Background	40.2	D	32.0	C
2022 Background Plus Project	41.0	D	32.5	C
2040 Background #	44.1	D	39.9	D
2040 Background Plus Project #	54.2	D	40.5	D

= Dual Westbound Left Turns, Protected Westbound Left Turn, Protected/Overlap Northbound Right, 135 Second Cycle Length (AM Only)

With construction of the project, the City of Commerce City is requiring build out of the eastern half of Havana Street to the ultimate cross section along project frontage. Havana Street is classified as a major collector roadway; therefore, the widening is anticipated to consist of 12 additional feet with a 6-foot designated bicycle lane. To accommodate this roadway widening, an additional 13 feet of right-of-way will be dedicated along Havana Street.

Havana Street Northern Right-In/Right-Out Access

With development of the project, a northern right-in/right-out access is proposed to be located along Havana Street approximately 3,700 feet south of the 104th Avenue and Joliet Street intersection (measured center to center). It is recommended that the westbound approach of the access operate with stop control with the installation of an R1-1 “STOP” sign. To further identify the proposed access as a right-in/right-out driveway, it is recommended that a R3-5(R) Right Turn Only sign be installed underneath the stop sign. Also, a R3-2 No Left Turn sign should be installed on the southeast corner of the access intersection visible to southbound drivers along Havana Street. With completion of the proposed development, the westbound right turn exit at this access intersection are anticipated to operate acceptably during the peak hours for 2022 and 2040. **Table 6** provides the results of the level of service at this intersection.

Table 6 –Havana Street Right-In/Right-Out Access LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
2022 Background Plus Project Westbound Right Turn	8.7	A	8.8	A
2040 Background Plus Project Westbound Right Turn	8.7	A	8.9	A

Havana Street Southern Full Access

A southern full movement access is proposed to be located along Havana Street approximately 4,100 feet south of the 104th Avenue and Joliet Street intersection (measured center to center). It is recommended that the westbound approach of the access operate with stop control with the installation of an R1-1 "STOP" sign. A southbound left turn lane and northbound right turn lane are anticipated at this intersection based on City standards and requirements. With completion of the proposed development, all movements at this intersection are anticipated to operate acceptably during the peak hours of 2022 and 2040. **Table 7** provides the results of the level of service at this intersection.

Table 7 – Havana Street Southern Full Access LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
2022 Background Plus Project				
Westbound Approach	9.7	A	10.0	B
Southbound Left	7.6	A	7.5	A
2040 Background Plus Project				
Westbound Approach	9.8	A	10.3	B
Southbound Left	7.6	A	7.5	A

5.3 CDOT Access Permit Analysis Need

The threshold for requiring an access permit along CDOT roadways occurs when project traffic is anticipated to increase the existing access traffic volumes by more than 20 percent. Both SH-2 and 104th Avenue (SH-44) exist as CDOT roadways within the project study area. Based on projections, the addition of 100th and Havana project traffic at the intersections of 96th Avenue/SH-2 and 104th Avenue (SH-44) and Joliet Street does not increase traffic volumes by more than 20 percent over existing; therefore, access permits are not anticipated to be required at these intersection locations.

5.4 Project Access Auxiliary Lane Analysis

The City of Commerce City Engineering Construction Standards and Specifications were used to determine if turn lanes are warranted for access into the project accesses. The City of Commerce City classifies Havana Street as a major collector roadway.

According to section 3.04.1, a left turn lane with storage length plus taper length is required for all access on a Major Collector roadway, and a right turn lane with storage length plus taper is required for any access on a Major Collector roadway with a projected peak hour right ingress turning volume greater than 25 vehicles per hour (vph).

Based on the major collector roadway classification and 2022 traffic volume projections, turn lane requirements at the project intersections along Havana Street are as follows:

- A northbound right turn lane **is not** warranted for the Havana Street Northern Right-In/Right-Out Access based on projected 2022 background plus project traffic volumes being 20 northbound right turns during the peak hour and the threshold being 25 vph.
- A northbound right turn lane **is** warranted for the Havana Street Southern Full Movement Access based on projected 2022 background plus project traffic volumes being 50 northbound right turns during the peak hour and the threshold being 25 vph. It is recommended that this lane be constructed with a length of 90 feet plus a 175-foot taper.
- A southbound left turn lane **is** warranted for the Havana Street Full Movement Access based on Havana Street being a Major Collector roadway. It is recommended that the southbound left turn be 140 feet long (calculated as a 90-foot deceleration length plus 50-foot storage length) plus a 175-foot taper. Construction of this southbound left turn lane will require the through lanes along Havana Street to be transitioned around this left turn lane at a taper rate of approximately 20.5 to 1 (based on $L = (W \cdot S^2)/60$). These through lane transitions will be planned and designed so that the bridge over the ditch to the north is not impacted.

5.5 Vehicle Queuing Analysis

Queuing analysis was conducted for the study area intersections per Commerce City standards and requirements. Results were obtained from the 95th percentile queue lengths obtained from the Synchro analysis. Queue analysis worksheets at the signalized intersections are provided in **Appendix E**. Queue length calculations for unsignalized intersections are provided within the level of service operational sheets provided in **Appendix D**. Results of the queuing analysis and recommendations at the study area intersections are provided in **Table 8**. Of note, any queue lengths calculated at less than one vehicle were rounded up to 25 feet to account for one vehicle of storage needed.

Table 8 – Turn Lane Queuing Analysis Results

Intersection Turn Lane	Existing Turn Lane Length (feet)	2022 Calculated Queue (feet)	2022 Recommended Length (feet)	2040 Calculated Queue (feet)	2040 Recommended Length (feet)
104th Avenue/Joliet Street					
Eastbound Left	325'	25'	325'	29'	325'
Westbound Left	425'	40'	425'	66'	425'
Northbound Left	175'	70'	175'	88'	175'
Northbound Right	250'	25'	250'	25'	250'
Southbound Left	100'	25'	100'	25'	100'
96th Avenue/Havana Street					
Eastbound Left	250'	25'	250'	25'	250'
Southbound Left	100'	25'	100'	25'	100'
96th Avenue/SH-2					
Eastbound Left	350'	90'	350'	127'	350'
Eastbound Right	525'	59'	525'	155'	525'
Westbound Left	500'	352'	500'	328'	500'
Westbound Right	275'	25'	275'	25'	275'
Northbound Left	375'	129'	375'	202'	375'
Northbound Right	275'	138'	275'	280'	300'
Southbound Left	375'	55'	375'	122'	375'
Southbound Right	300'	25'	300'	25'	300'
Havana Street RIRO Access					
Westbound Approach	DNE	25'	C	25'	C
Havana Street Full Access					
Westbound Approach	DNE	25'	C	25'	C
Southbound Left	DNE	25'	140' (CCS)	25'	140' (CCS)
Northbound Right	DNE	25'	90' (CCS)	25'	90' (CCS)

DNE = Does Not Exist, C = Continuous Lane, CCS = City of Commerce City Engineering Construction Standards and Specifications

As shown in the table representing the queuing results, all anticipated queues are accommodated or managed within existing turn bay lengths with project traffic in the 2022 project build out year.

By 2040, the queue for the northbound right turn lane at the intersection of 96th Avenue and SH-2 may be longer than the available storage. Based on this, the existing 275-foot northbound right turn lane may need to be lengthened to 300 feet.

Based on the results of the traffic analysis, the key intersection recommended lanes and control are shown in **Figure 11** for the 2022 horizon and **Figure 12** for the 2040 horizon.

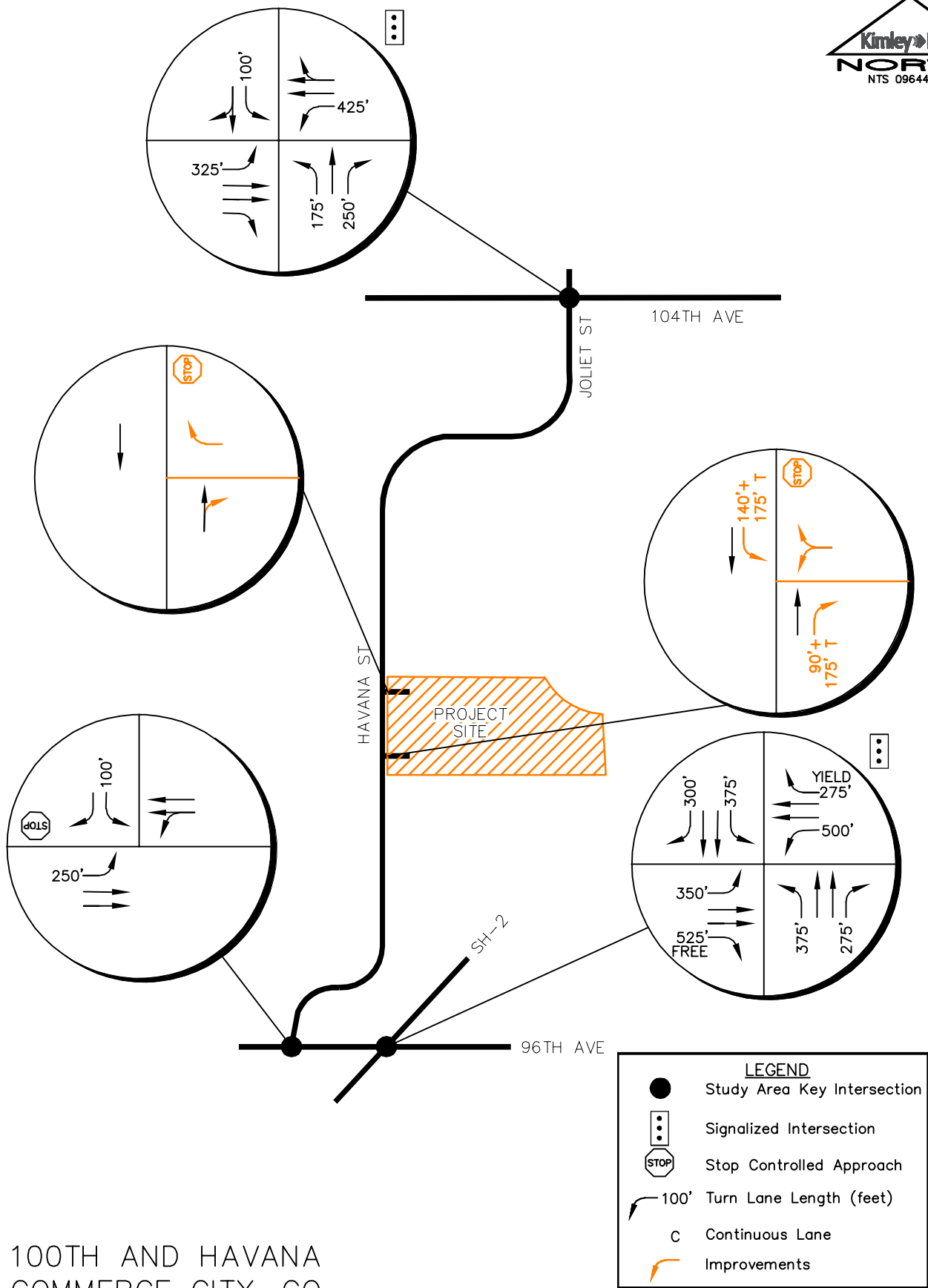
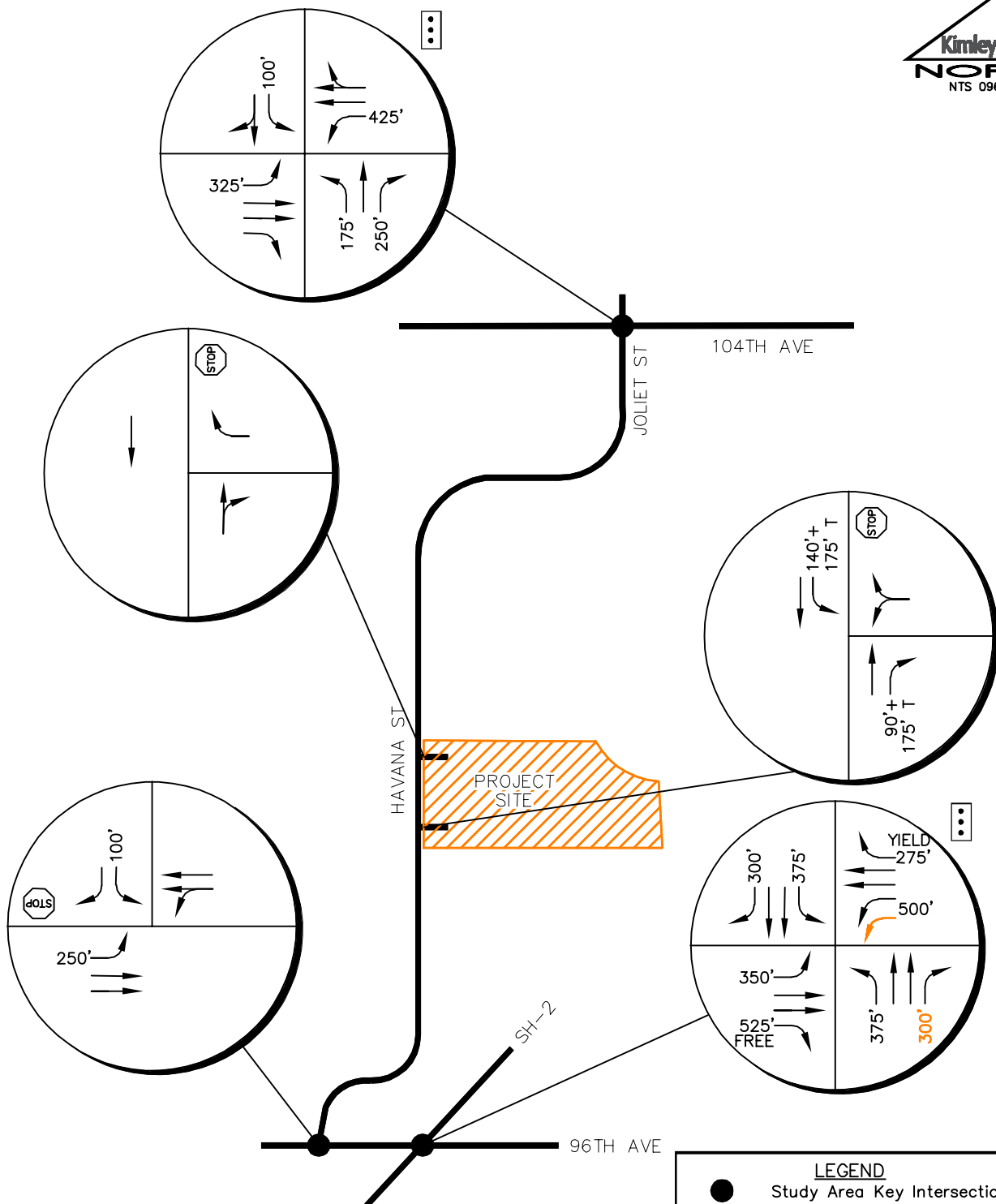


FIGURE 11



100TH AND HAVANA
COMMERCE CITY, CO
2040 RECOMMENDED
LANE CONFIGURATIONS AND CONTROL

LEGEND	
	Study Area Key Intersection
	Signalized Intersection
	Stop Controlled Approach
	100' Turn Lane Length (feet)
	C Continuous Lane
	Improvements

FIGURE 12

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes the 100th and Havana project proposed on the east side of Havana Street between 102nd Avenue and Heinz Way will be successfully incorporated into the existing and future roadway network. The proposed project development resulted in the following recommendations and conclusions:

2022 Buildout Improvement Recommendations

- The threshold for requiring access permits along CDOT roadways occurs when project traffic is anticipated to increase the existing access traffic volumes by more than 20 percent. Both SH-2 and 104th Avenue (SH-44) exist within the project study area and are CDOT roadways. Based on projections, the addition of 100th and Havana project traffic at the intersections of 96th Avenue/SH-2 and 104th Avenue (SH-44)/Joliet Street does not increase traffic volumes by more than 20 percent over existing; therefore, access permits are not anticipated to be required for these intersections.
- Direct access to the site is proposed to be one northern right-in/right-out access and one southern full movement access along Havana Street, approximately 3,700 feet and 4,100 feet (measured center to center) south of the 104th Avenue/Joliet Street intersection, respectively. It is recommended that the exiting access approaches at both accesses to Havana Street be stop controlled with the installation of R1-1 “STOP” signs. One vehicle of storage, 25 feet for passenger cars or 50 feet for trucks, of throat depth is recommended to be provided for the project accesses based on vehicle usage anticipated.
- To restrict the northern access to right turn movements only, it is recommended that a R3-5(R) Right Turn Only sign be installed underneath the STOP sign. Likewise, a R3-2 No Left Turn sign should be installed on the southeast corner of the access intersection visible to southbound drivers along Havana Street.
- Per City of Commerce City Standards, it is recommended that a 140-foot southbound left turn lane with a 175-foot taper be constructed at the southern full movement project access along Havana Street. Construction of this southbound left turn lane will require the through lanes along Havana Street to be transitioned around this left turn lane at a taper rate of

approximately 20.5 to 1 (based on $L = (W \cdot S^2)/60$). These through lane transitions will be planned and designed so that the bridge over the ditch to the north is not impacted. Likewise, a northbound right turn lane of 90 feet with a 175-foot taper is warranted based on City standards for the southern access.

- With construction of the project, the City of Commerce City is requiring build out of the eastern half of Havana Street to the ultimate cross section along project frontage. Havana Street is classified as a Major Collector roadway; therefore, the widening is anticipated to consist of 12 additional feet with a 6-foot designated bicycle lane. To accommodate this roadway widening, an additional 13 feet of right-of-way will be dedicated along Havana Street.

2040 Long-Term Improvement Recommendations

- By 2040, the intersection of 96th Avenue and SH-2 may operate unacceptably during the morning peak hour with or without the addition of project traffic if future traffic volume projections are realized. In order for this intersection to operate acceptably at LOS D, an additional westbound left turn lane may need to be constructed for dual left turn lanes to operate with protected only phasing. Also, the northbound right turn lane may need to be extended from 275 feet to 300 feet and the northbound right turn movement may need to operate with protected overlap phasing. Of note, none of these improvements and movements are anticipated to include traffic from this project.

General Improvements

- All on-site improvements should be incorporated into the Civil Drawings and conform to standards of the City of Commerce City, The Colorado Department of Transportation (CDOT), and the Manual on Uniform Traffic Control Devices (MUTCD) – 2009 Edition.

APPENDICES

APPENDIX A

Intersection Count Sheets



Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
AM Peak
104th Ave and Joliet St

File Name : 104th and Joliet AM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 1

Groups Printed- Automobiles

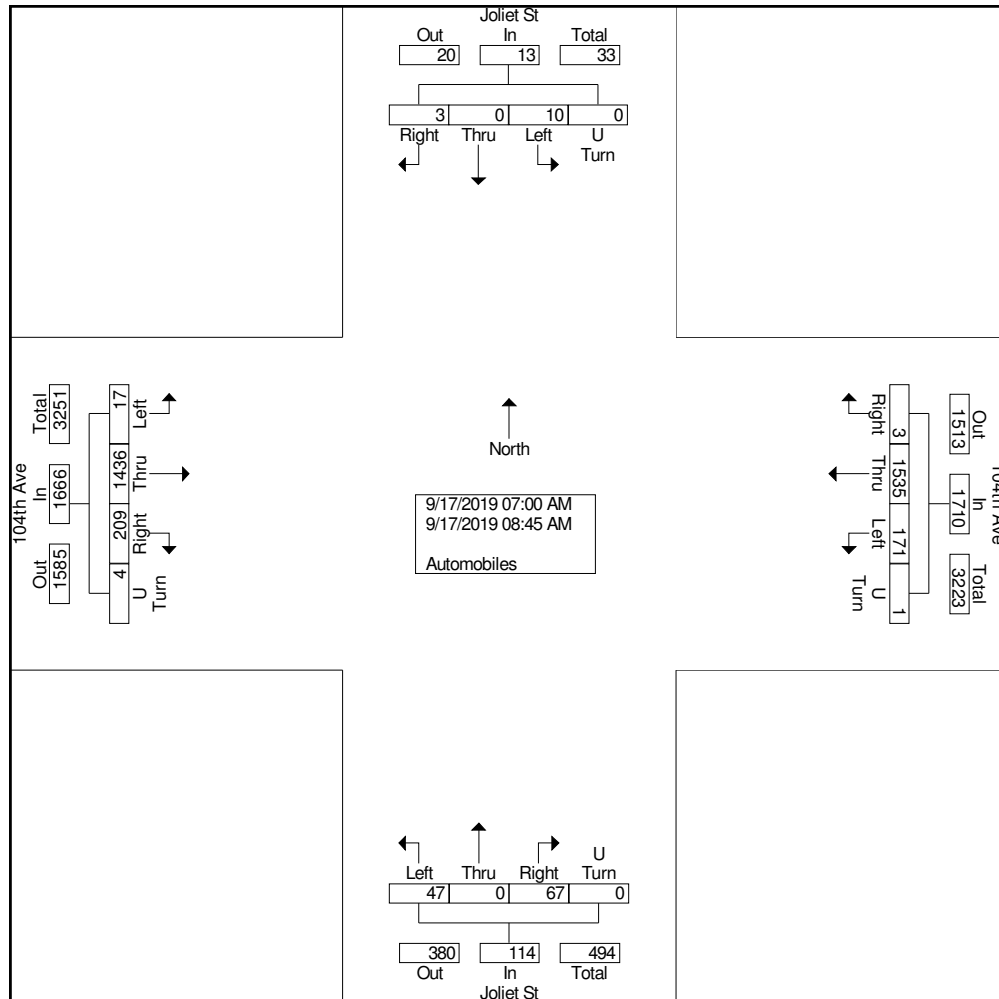
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Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
07:00 AM	12	180	33	1	226	22	215	0	0	237	2	0	6	0	8	0	0	0	0	0	471
07:15 AM	1	187	25	0	213	23	231	0	0	254	7	0	3	0	10	2	0	0	0	2	479
07:30 AM	1	208	30	1	240	26	180	0	0	206	3	0	4	0	7	0	0	1	0	1	454
07:45 AM	0	173	32	0	205	37	237	0	0	274	6	0	8	0	14	1	0	0	0	1	494
Total	14	748	120	2	884	108	863	0	0	971	18	0	21	0	39	3	0	1	0	4	1898
08:00 AM	1	203	35	0	239	20	205	2	1	228	9	0	15	0	24	3	0	0	0	3	494
08:15 AM	2	185	20	0	207	16	226	1	0	243	4	0	13	0	17	0	0	1	0	1	468
08:30 AM	0	179	15	1	195	17	136	0	0	153	9	0	8	0	17	3	0	1	0	4	369
08:45 AM	0	121	19	1	141	10	105	0	0	115	7	0	10	0	17	1	0	0	0	1	274
Total	3	688	89	2	782	63	672	3	1	739	29	0	46	0	75	7	0	2	0	9	1605
Grand Total	17	1436	209	4	1666	171	1535	3	1	1710	47	0	67	0	114	10	0	3	0	13	3503
Apprch %	1	86.2	12.5	0.2		10	89.8	0.2	0.1		41.2	0	58.8	0		76.9	0	23.1	0		
Total %	0.5	41	6	0.1	47.6	4.9	43.8	0.1	0	48.8	1.3	0	1.9	0	3.3	0.3	0	0.1	0	0.4	



Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
AM Peak
104th Ave and Joliet St

File Name : 104th and Joliet AM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 2



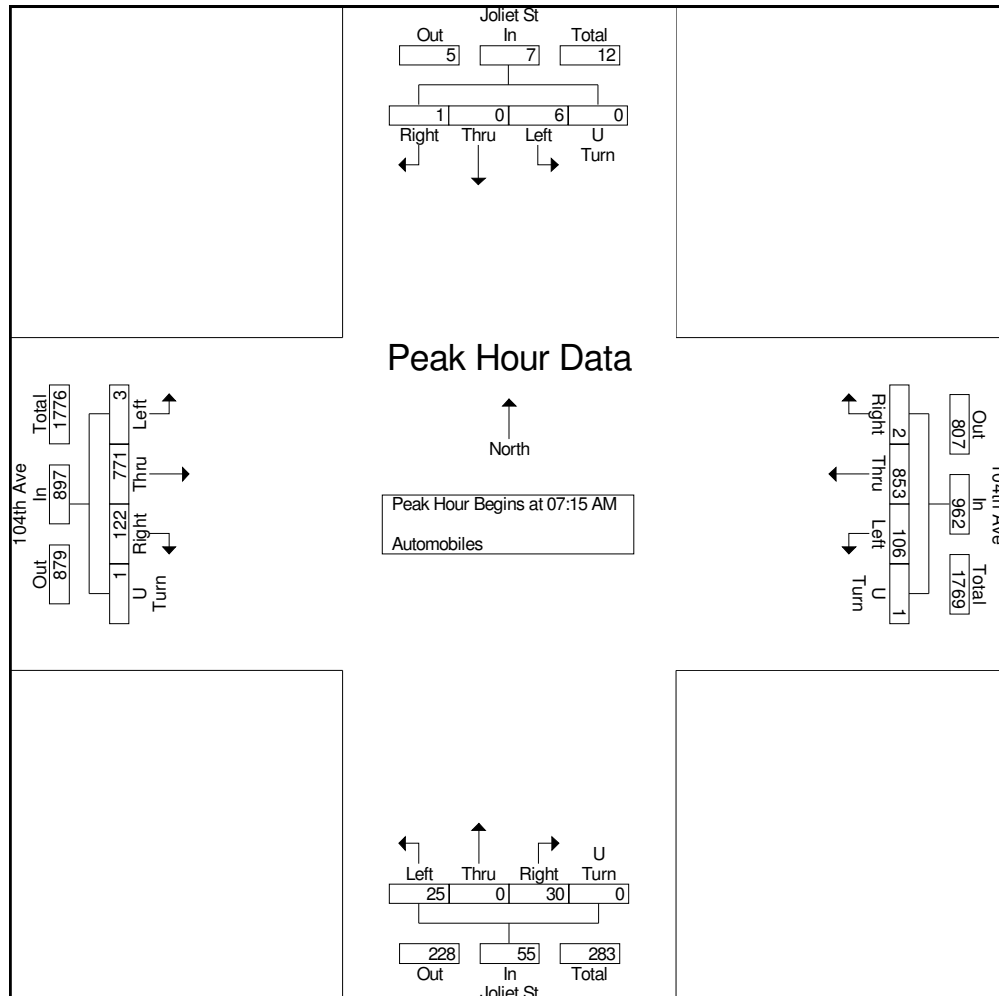


Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
AM Peak
104th Ave and Joliet St

File Name : 104th and Joliet AM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 3

	104th Ave Eastbound					104th Ave Westbound					Joliet St Northbound					Joliet St Southbound					
Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	1	187	25	0	213	23	231	0	0	254	7	0	3	0	10	2	0	0	0	2	479
07:30 AM	1	208	30	1	240	26	180	0	0	206	3	0	4	0	7	0	0	1	0	1	454
07:45 AM	0	173	32	0	205	37	237	0	0	274	6	0	8	0	14	1	0	0	0	1	494
08:00 AM	1	203	35	0	239	20	205	2	1	228	9	0	15	0	24	3	0	0	0	3	494
Total Volume	3	771	122	1	897	106	853	2	1	962	25	0	30	0	55	6	0	1	0	7	1921
% App. Total	0.3	86	13.6	0.1		11	88.7	0.2	0.1		45.5	0	54.5	0		85.7	0	14.3	0		
PHF	.750	.927	.871	.250	.934	.716	.900	.250	.250	.878	.694	.000	.500	.000	.573	.500	.000	.250	.000	.583	.972





Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
PM Peak
104th Ave and Joliet St

File Name : 104th and Joliet PM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 1

Groups Printed- Automobiles

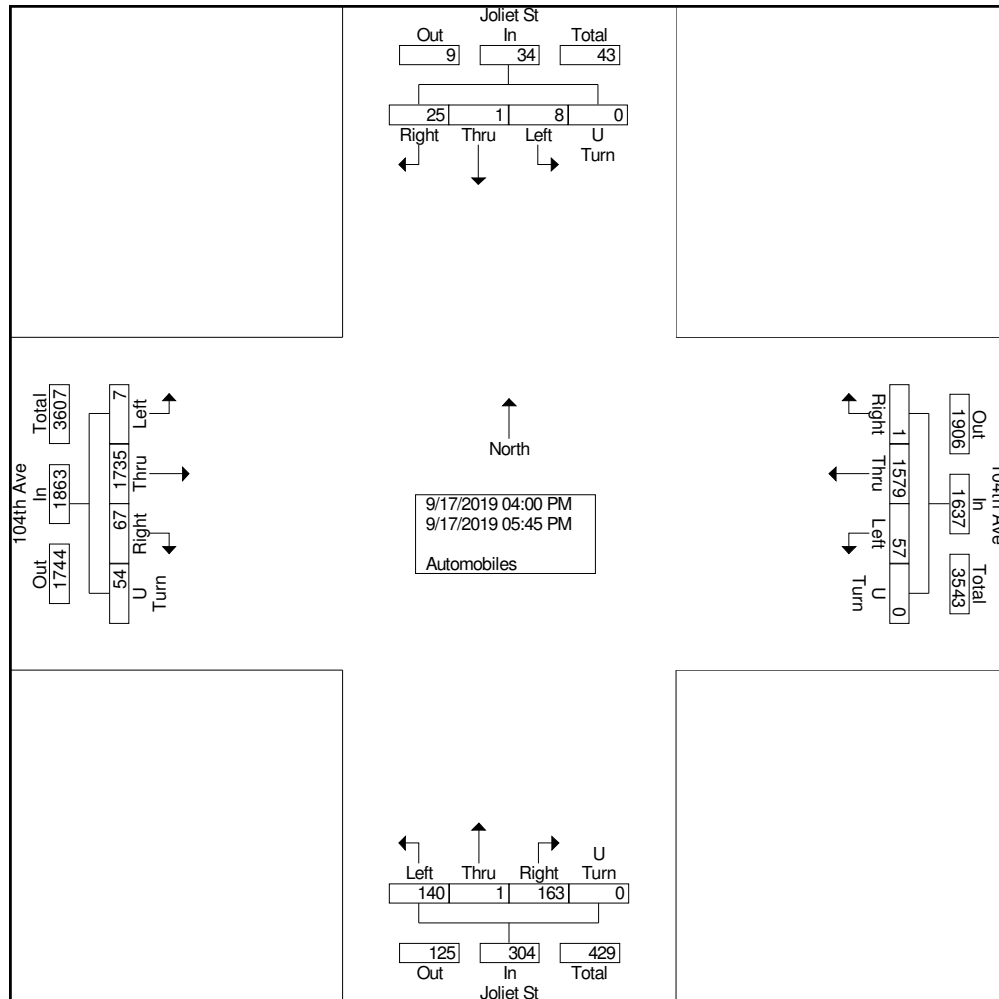
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04:00 PM	2	226	7	3	238	7	172	0	0	179	22	1	15	0	38	3	0	6	0	9	464
04:15 PM	1	208	9	1	219	6	164	0	0	170	18	0	20	0	38	1	0	2	0	3	430
04:30 PM	2	252	5	21	280	3	237	0	0	240	15	0	30	0	45	0	0	7	0	7	572
04:45 PM	2	215	12	10	239	10	212	0	0	222	27	0	18	0	45	1	0	3	0	4	510
Total	7	901	33	35	976	26	785	0	0	811	82	1	83	0	166	5	0	18	0	23	1976
05:00 PM	0	224	9	8	241	14	211	0	0	225	19	0	30	0	49	0	0	0	0	0	515
05:15 PM	0	213	10	5	228	3	207	1	0	211	17	0	21	0	38	1	0	2	0	3	480
05:30 PM	0	179	11	5	195	1	184	0	0	185	16	0	13	0	29	1	1	5	0	7	416
05:45 PM	0	218	4	1	223	13	192	0	0	205	6	0	16	0	22	1	0	0	0	1	451
Total	0	834	34	19	887	31	794	1	0	826	58	0	80	0	138	3	1	7	0	11	1862
Grand Total	7	1735	67	54	1863	57	1579	1	0	1637	140	1	163	0	304	8	1	25	0	34	3838
Apprch %	0.4	93.1	3.6	2.9		3.5	96.5	0.1	0		46.1	0.3	53.6	0		23.5	2.9	73.5	0		
Total %	0.2	45.2	1.7	1.4	48.5	1.5	41.1	0	0	42.7	3.6	0	4.2	0	7.9	0.2	0	0.7	0	0.9	



Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
PM Peak
104th Ave and Joliet St

File Name : 104th and Joliet PM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 2



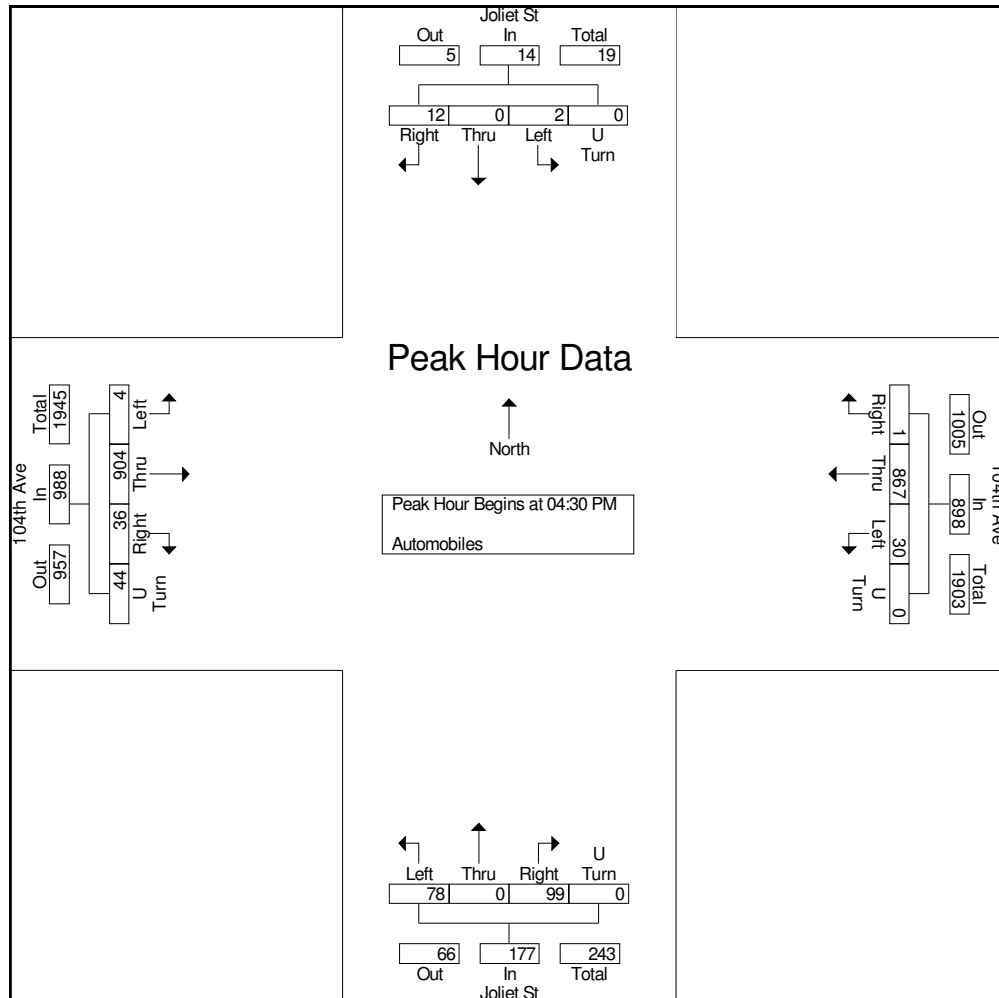


Ridgeview Data
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Commerce City, CO
100th and Havana Industrial
PM Peak
104th Ave and Joliet St

File Name : 104th and Joliet PM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 3

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Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	2	252	5	21	280	3	237	0	0	240	15	0	30	0	45	0	0	7	0	7	572
04:45 PM	2	215	12	10	239	10	212	0	0	222	27	0	18	0	45	1	0	3	0	4	510
05:00 PM	0	224	9	8	241	14	211	0	0	225	19	0	30	0	49	0	0	0	0	0	515
05:15 PM	0	213	10	5	228	3	207	1	0	211	17	0	21	0	38	1	0	2	0	3	480
Total Volume	4	904	36	44	988	30	867	1	0	898	78	0	99	0	177	2	0	12	0	14	2077
% App. Total	0.4	91.5	3.6	4.5		3.3	96.5	0.1	0		44.1	0	55.9	0		14.3	0	85.7	0		
PHF	.500	.897	.750	.524	.882	.536	.915	.250	.000	.935	.722	.000	.825	.000	.903	.500	.000	.429	.000	.500	.908





Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
AM Peak
96th Ave and Havana St

File Name : 96th and Havana AM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 1

Groups Printed- Automobiles

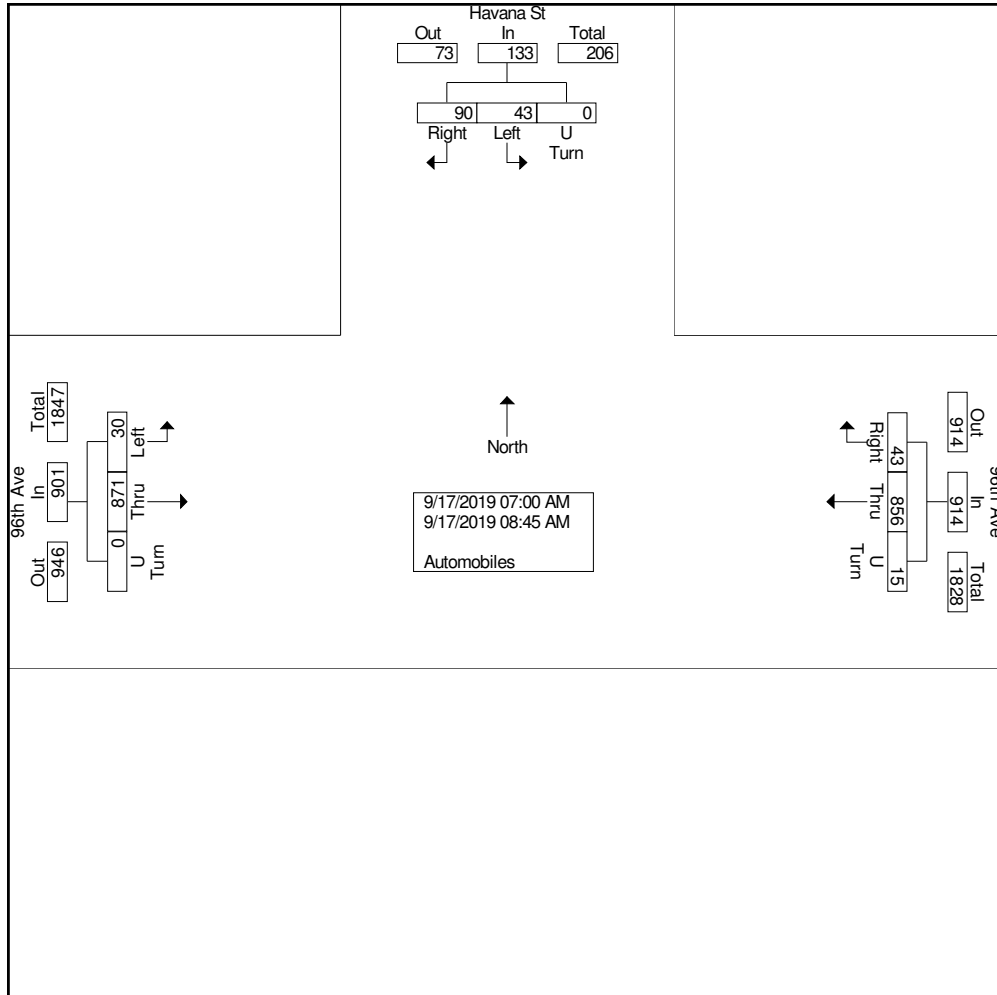
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	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	
07:00 AM	5	124	0	129	155	8	12	175	6	21	0	27	331
07:15 AM	3	114	0	117	134	6	0	140	8	10	0	18	275
07:30 AM	4	113	0	117	112	7	1	120	4	10	0	14	251
07:45 AM	2	110	0	112	116	7	2	125	7	17	0	24	261
Total	14	461	0	475	517	28	15	560	25	58	0	83	1118
08:00 AM	6	106	0	112	88	3	0	91	5	7	0	12	215
08:15 AM	3	112	0	115	98	4	0	102	9	12	0	21	238
08:30 AM	4	114	0	118	82	2	0	84	3	7	0	10	212
08:45 AM	3	78	0	81	71	6	0	77	1	6	0	7	165
Total	16	410	0	426	339	15	0	354	18	32	0	50	830
Grand Total	30	871	0	901	856	43	15	914	43	90	0	133	1948
Apprch %	3.3	96.7	0		93.7	4.7	1.6		32.3	67.7	0		
Total %	1.5	44.7	0	46.3	43.9	2.2	0.8	46.9	2.2	4.6	0	6.8	



Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
AM Peak
96th Ave and Havana St

File Name : 96th and Havana AM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 2



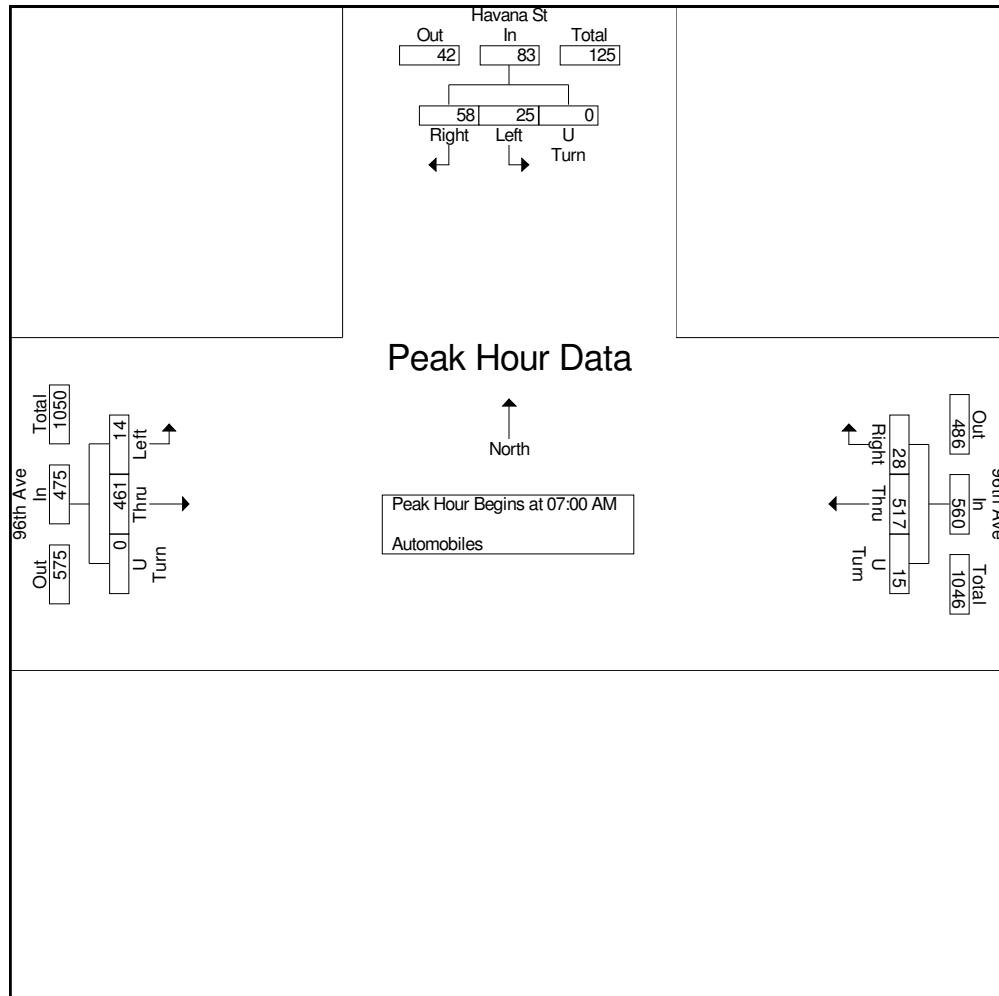


Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
AM Peak
96th Ave and Havana St

File Name : 96th and Havana AM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 3

	96th Ave Eastbound				96th Ave Westbound				Havana St Southbound				
Start Time	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	5	124	0	129	155	8	12	175	6	21	0	27	331
07:15 AM	3	114	0	117	134	6	0	140	8	10	0	18	275
07:30 AM	4	113	0	117	112	7	1	120	4	10	0	14	251
07:45 AM	2	110	0	112	116	7	2	125	7	17	0	24	261
Total Volume	14	461	0	475	517	28	15	560	25	58	0	83	1118
% App. Total	2.9	97.1	0		92.3	5	2.7		30.1	69.9	0		
PHF	.700	.929	.000	.921	.834	.875	.313	.800	.781	.690	.000	.769	.844





Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
PM Peak
96th Ave and Havana St

File Name : 96th and Havana PM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 1

Groups Printed- Automobiles

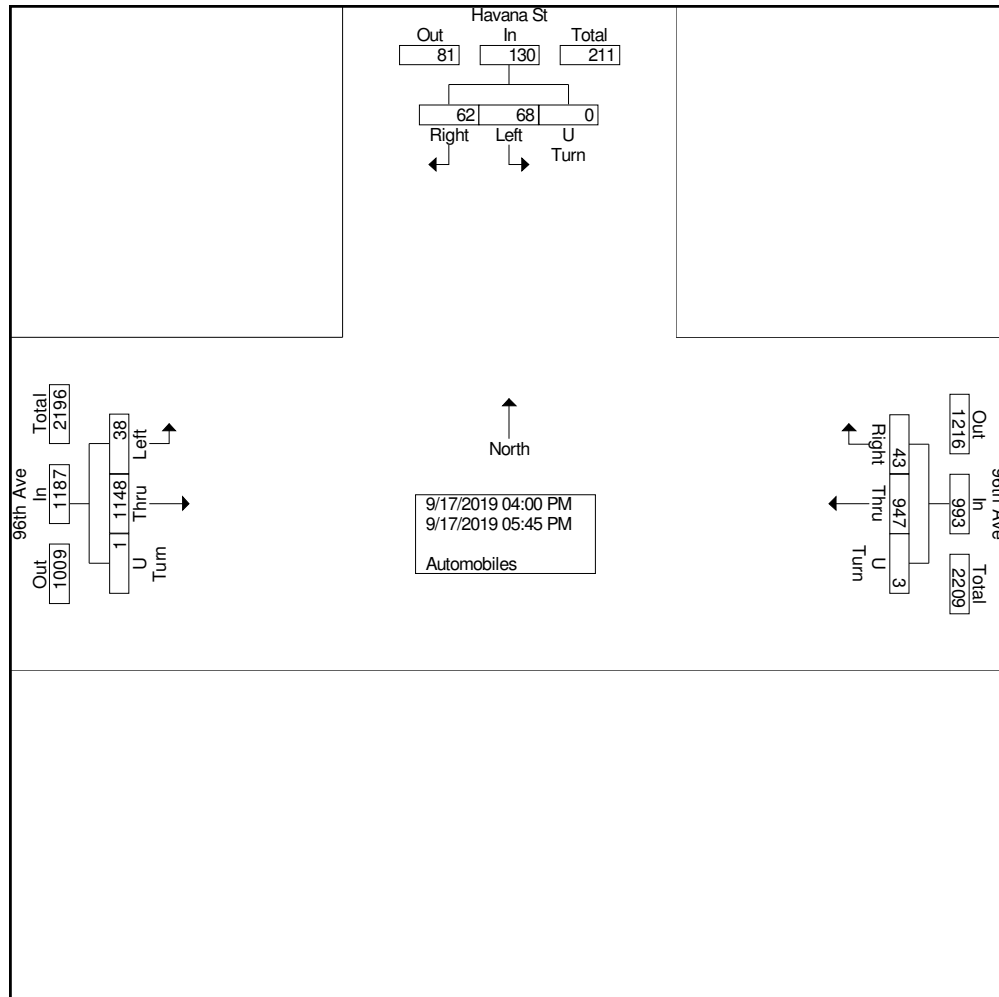
Start Time	96th Ave Eastbound				96th Ave Westbound				Havana St Southbound				Int. Total
	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	
04:00 PM	4	139	0	143	127	11	1	139	16	8	0	24	306
04:15 PM	8	131	0	139	108	5	0	113	13	8	0	21	273
04:30 PM	2	149	0	151	120	5	0	125	6	12	0	18	294
04:45 PM	6	145	0	151	134	4	0	138	10	5	0	15	304
Total	20	564	0	584	489	25	1	515	45	33	0	78	1177
05:00 PM	5	186	0	191	121	1	0	122	7	10	0	17	330
05:15 PM	5	153	0	158	108	3	1	112	6	7	0	13	283
05:30 PM	6	134	0	140	130	7	0	137	4	5	0	9	286
05:45 PM	2	111	1	114	99	7	1	107	6	7	0	13	234
Total	18	584	1	603	458	18	2	478	23	29	0	52	1133
Grand Total	38	1148	1	1187	947	43	3	993	68	62	0	130	2310
Apprch %	3.2	96.7	0.1		95.4	4.3	0.3		52.3	47.7	0		
Total %	1.6	49.7	0	51.4	41	1.9	0.1	43	2.9	2.7	0	5.6	



Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
PM Peak
96th Ave and Havana St

File Name : 96th and Havana PM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 2



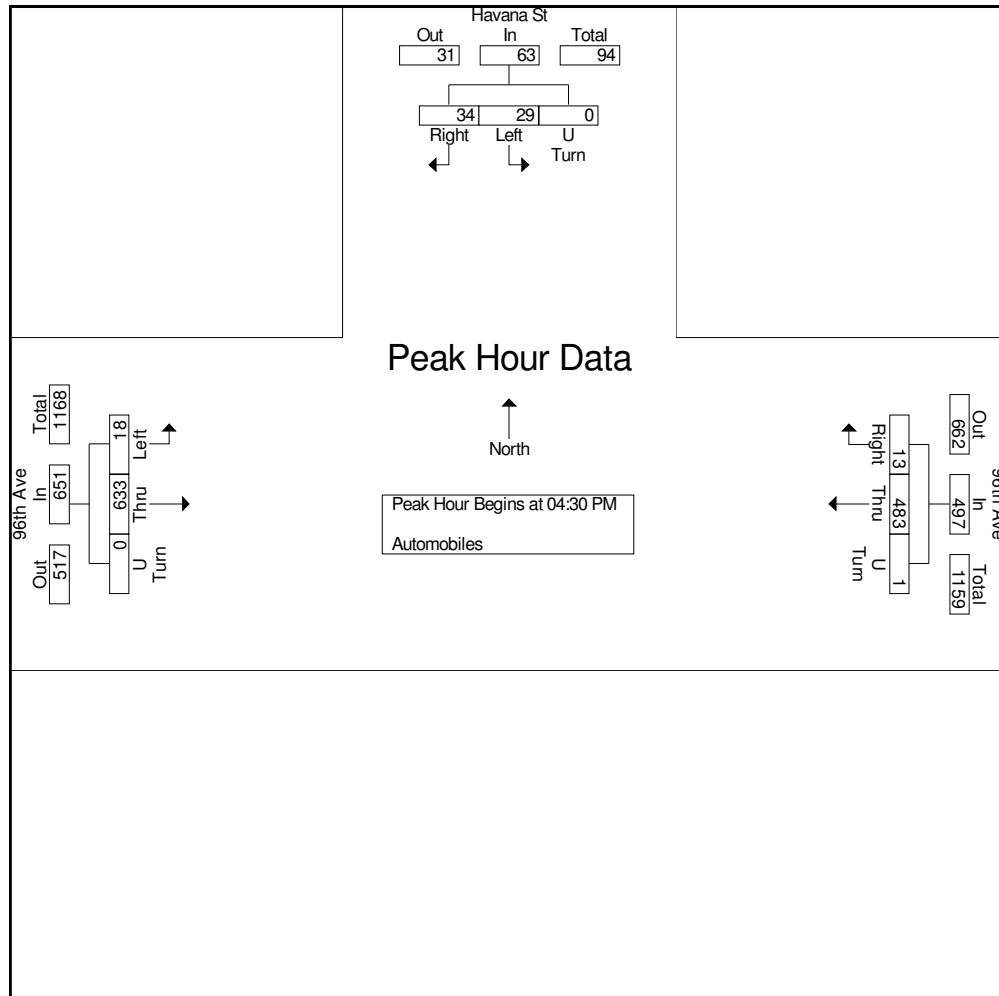


Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
PM Peak
96th Ave and Havana St

File Name : 96th and Havana PM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 3

	96th Ave Eastbound				96th Ave Westbound				Havana St Southbound				
Start Time	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	2	149	0	151	120	5	0	125	6	12	0	18	294
04:45 PM	6	145	0	151	134	4	0	138	10	5	0	15	304
05:00 PM	5	186	0	191	121	1	0	122	7	10	0	17	330
05:15 PM	5	153	0	158	108	3	1	112	6	7	0	13	283
Total Volume	18	633	0	651	483	13	1	497	29	34	0	63	1211
% App. Total	2.8	97.2	0		97.2	2.6	0.2		46	54	0		
PHF	.750	.851	.000	.852	.901	.650	.250	.900	.725	.708	.000	.875	.917





Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
AM Peak
96th Ave and State Hwy 2

File Name : 96th and Hwy 2 AM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 1

Groups Printed- Automobiles

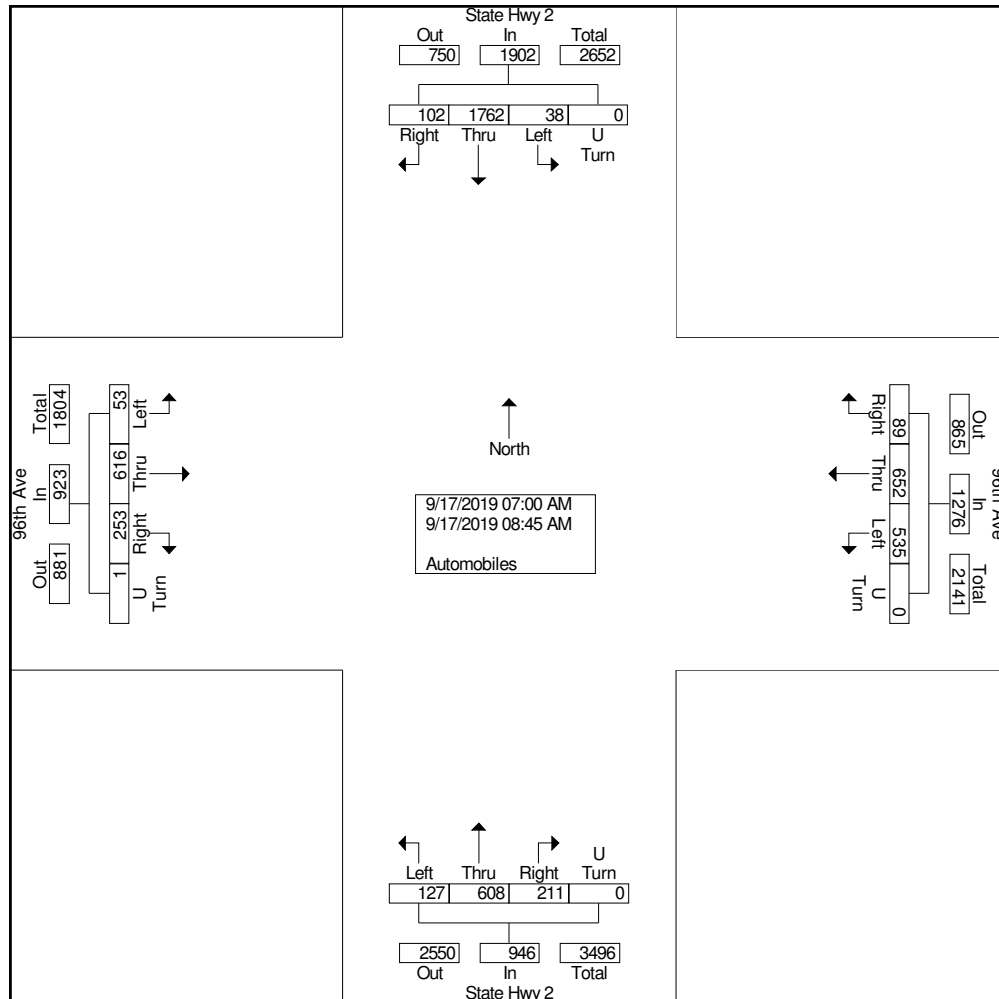
	96th Ave Eastbound					96th Ave Westbound					State Hwy 2 Northbound					State Hwy 2 Southbound					
Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
07:00 AM	10	99	51	0	160	83	129	10	0	222	17	80	15	0	112	2	342	12	0	356	850
07:15 AM	9	77	39	0	125	89	102	10	0	201	16	76	29	0	121	1	306	18	0	325	772
07:30 AM	5	76	31	0	112	83	82	18	0	183	14	82	45	0	141	5	285	19	0	309	745
07:45 AM	3	82	35	0	120	80	84	14	0	178	16	79	30	0	125	5	232	19	0	256	679
Total	27	334	156	0	517	335	397	52	0	784	63	317	119	0	499	13	1165	68	0	1246	3046
08:00 AM	3	87	24	1	115	62	73	20	0	155	11	86	26	0	123	6	206	6	0	218	611
08:15 AM	2	72	29	0	103	46	74	8	0	128	12	81	20	0	113	7	157	8	0	172	516
08:30 AM	13	74	26	0	113	55	60	4	0	119	18	56	26	0	100	8	106	13	0	127	459
08:45 AM	8	49	18	0	75	37	48	5	0	90	23	68	20	0	111	4	128	7	0	139	415
Total	26	282	97	1	406	200	255	37	0	492	64	291	92	0	447	25	597	34	0	656	2001
Grand Total	53	616	253	1	923	535	652	89	0	1276	127	608	211	0	946	38	1762	102	0	1902	5047
Apprch %	5.7	66.7	27.4	0.1		41.9	51.1	7	0		13.4	64.3	22.3	0		2	92.6	5.4	0		
Total %	1.1	12.2	5	0	18.3	10.6	12.9	1.8	0	25.3	2.5	12	4.2	0	18.7	0.8	34.9	2	0	37.7	



Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
AM Peak
96th Ave and State Hwy 2

File Name : 96th and Hwy 2 AM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 2



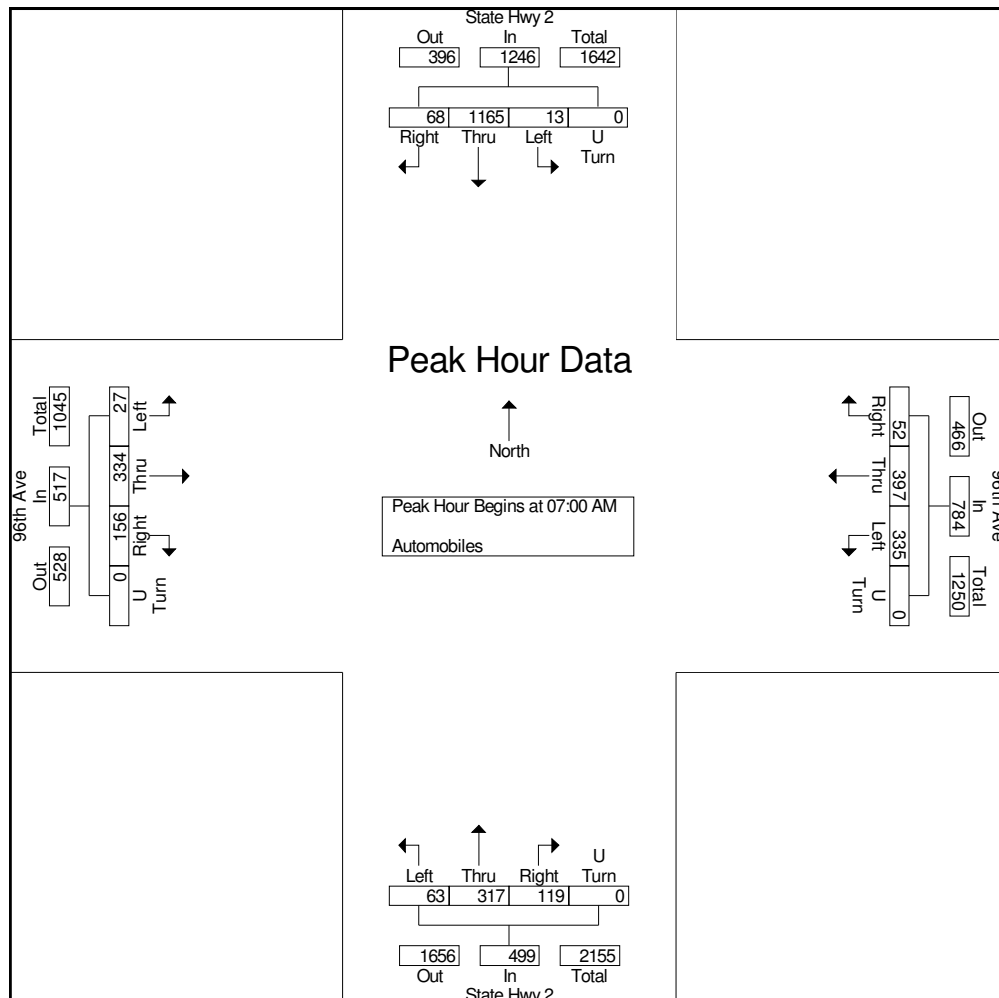


Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
AM Peak
96th Ave and State Hwy 2

File Name : 96th and Hwy 2 AM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 3

	96th Ave Eastbound					96th Ave Westbound					State Hwy 2 Northbound					State Hwy 2 Southbound					
Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	10	99	51	0	160	83	129	10	0	222	17	80	15	0	112	2	342	12	0	356	850
07:15 AM	9	77	39	0	125	89	102	10	0	201	16	76	29	0	121	1	306	18	0	325	772
07:30 AM	5	76	31	0	112	83	82	18	0	183	14	82	45	0	141	5	285	19	0	309	745
07:45 AM	3	82	35	0	120	80	84	14	0	178	16	79	30	0	125	5	232	19	0	256	679
Total Volume	27	334	156	0	517	335	397	52	0	784	63	317	119	0	499	13	1165	68	0	1246	3046
% App. Total	5.2	64.6	30.2	0		42.7	50.6	6.6	0		12.6	63.5	23.8	0		1	93.5	5.5	0		
PHF	.675	.843	.765	.000	.808	.941	.769	.722	.000	.883	.926	.966	.661	.000	.885	.650	.852	.895	.000	.875	.896





Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
PM Peak
96th Ave and State Hwy 2

File Name : 96th and Hwy 2 PM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 1

Groups Printed- Automobiles

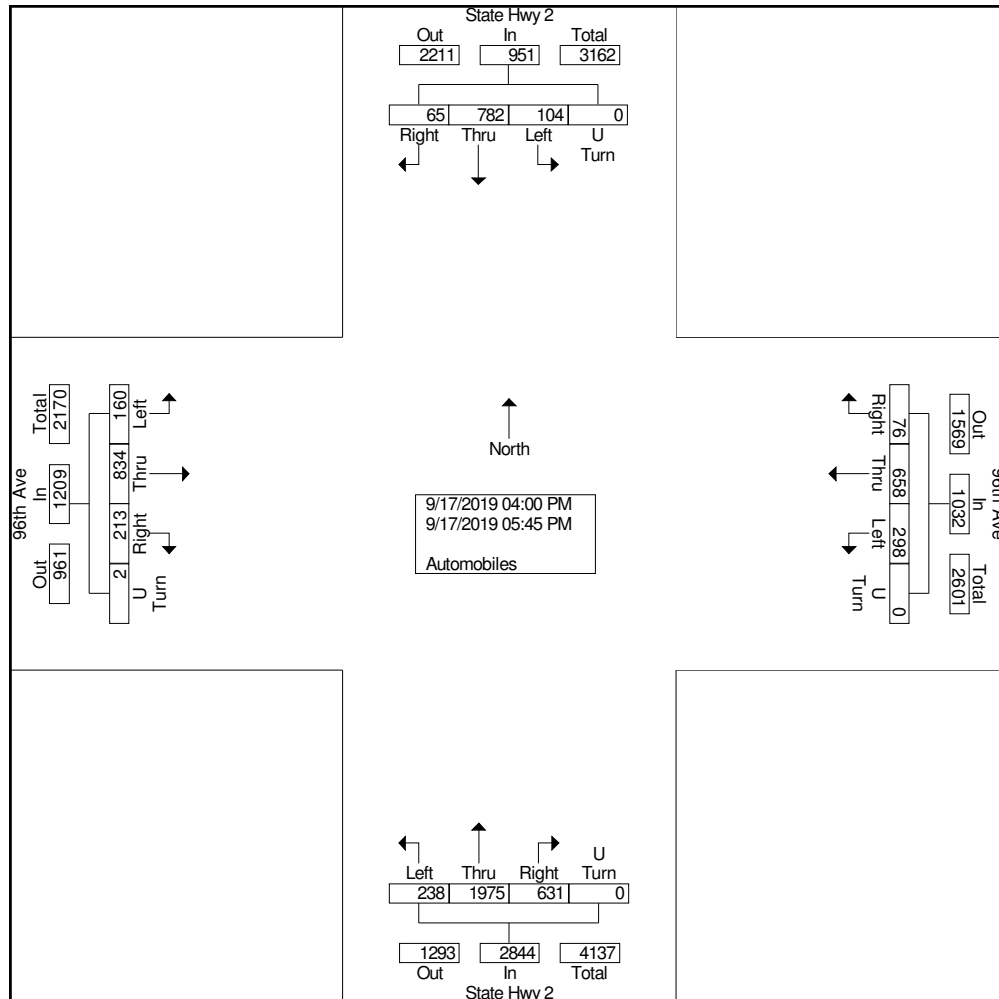
	96th Ave Eastbound					96th Ave Westbound					State Hwy 2 Northbound					State Hwy 2 Southbound					
Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
04:00 PM	19	80	35	0	134	41	79	12	0	132	39	208	50	0	297	7	77	4	0	88	651
04:15 PM	16	113	35	0	164	35	81	11	0	127	24	253	79	0	356	6	88	7	0	101	748
04:30 PM	14	107	32	0	153	43	88	11	0	142	23	222	84	0	329	13	87	13	0	113	737
04:45 PM	30	97	23	0	150	40	88	8	0	136	23	282	81	0	386	23	98	7	0	128	800
Total	79	397	125	0	601	159	336	42	0	537	109	965	294	0	1368	49	350	31	0	430	2936
05:00 PM	20	136	19	0	175	32	90	8	0	130	35	294	81	0	410	15	93	5	0	113	828
05:15 PM	24	119	21	1	165	39	83	8	0	130	28	267	107	0	402	18	134	5	0	157	854
05:30 PM	20	97	28	0	145	35	73	10	0	118	33	219	76	0	328	9	102	14	0	125	716
05:45 PM	17	85	20	1	123	33	76	8	0	117	33	230	73	0	336	13	103	10	0	126	702
Total	81	437	88	2	608	139	322	34	0	495	129	1010	337	0	1476	55	432	34	0	521	3100
Grand Total	160	834	213	2	1209	298	658	76	0	1032	238	1975	631	0	2844	104	782	65	0	951	6036
Apprch %	13.2	69	17.6	0.2		28.9	63.8	7.4	0		8.4	69.4	22.2	0		10.9	82.2	6.8	0		
Total %	2.7	13.8	3.5	0	20	4.9	10.9	1.3	0	17.1	3.9	32.7	10.5	0	47.1	1.7	13	1.1	0	15.8	



Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
PM Peak
96th Ave and State Hwy 2

File Name : 96th and Hwy 2 PM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 2



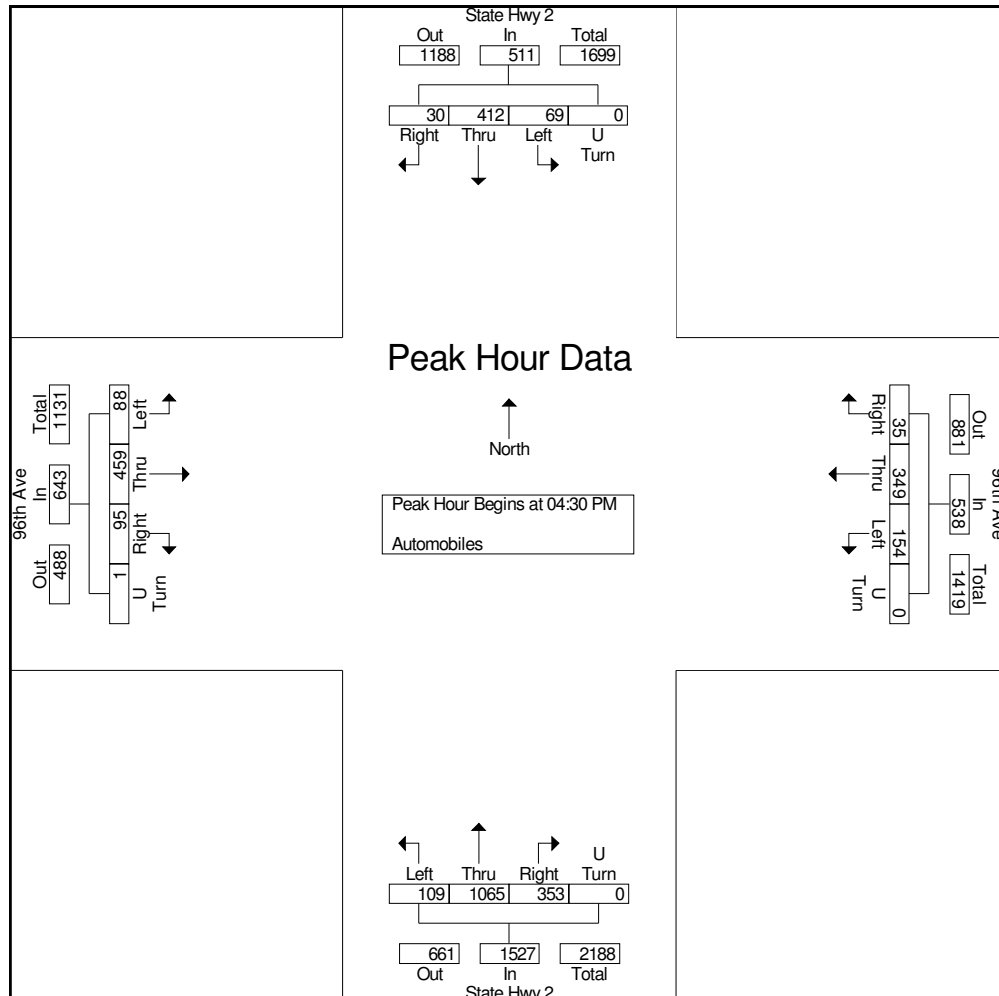


Ridgeview Data
Collection

Commerce City, CO
100th and Havana Industrial
PM Peak
96th Ave and State Hwy 2

File Name : 96th and Hwy 2 PM
Site Code : IPO 457
Start Date : 9/17/2019
Page No : 3

	96th Ave Eastbound					96th Ave Westbound					State Hwy 2 Northbound					State Hwy 2 Southbound					
Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	14	107	32	0	153	43	88	11	0	142	23	222	84	0	329	13	87	13	0	113	737
04:45 PM	30	97	23	0	150	40	88	8	0	136	23	282	81	0	386	23	98	7	0	128	800
05:00 PM	20	136	19	0	175	32	90	8	0	130	35	294	81	0	410	15	93	5	0	113	828
05:15 PM	24	119	21	1	165	39	83	8	0	130	28	267	107	0	402	18	134	5	0	157	854
Total Volume	88	459	95	1	643	154	349	35	0	538	109	1065	353	0	1527	69	412	30	0	511	3219
% App. Total	13.7	71.4	14.8	0.2		28.6	64.9	6.5	0		7.1	69.7	23.1	0		13.5	80.6	5.9	0		
PHF	.733	.844	.742	.250	.919	.895	.969	.795	.000	.947	.779	.906	.825	.000	.931	.750	.769	.577	.000	.814	.942



Daily Vehicle Volume Report

Study Date: Tuesday, 09/17/2019

Unit ID: RDC 17

Location: Havana Street, Commerce City, CO

Comments: North/South near 100th

	Southbound Volume	Northbound Volume	Total Volume
00:00 - 00:59	0	0	0
01:00 - 01:59	0	1	1
02:00 - 02:59	5	0	5
03:00 - 03:59	6	2	8
04:00 - 04:59	9	2	11
05:00 - 05:59	37	8	45
06:00 - 06:59	58	15	73
07:00 - 07:59	62	29	91
08:00 - 08:59	46	39	85
09:00 - 09:59	35	17	52
10:00 - 10:59	41	32	73
11:00 - 11:59	59	33	92
12:00 - 12:59	56	33	89
13:00 - 13:59	47	53	100
14:00 - 14:59	53	38	91
15:00 - 15:59	87	59	146
16:00 - 16:59	78	47	125
17:00 - 17:59	66	25	91
18:00 - 18:59	37	27	64
19:00 - 19:59	21	5	26
20:00 - 20:59	24	2	26
21:00 - 21:59	15	0	15
22:00 - 22:59	3	1	4
23:00 - 23:59	4	0	4
Totals	849	468	1317
AM Peak Time	06:27 - 07:26	08:10 - 09:09	06:27 - 07:26
AM Peak Volume	67	46	94
PM Peak Time	15:30 - 16:29	15:18 - 16:17	15:20 - 16:19
PM Peak Volume	101	79	176

APPENDIX B

CDOT Annual Traffic Data

100th and Havana Traffic Study

ROUTE	REFPT	ENDREFPT	LENGTH	UPDATEYR	AADT	AADTYR	PKTRK	OFFPKTRK	YR20FACTOR	DHV	VCRATIO	VCRATIO20	AADTTRUCKS	DVMT	VMT	LOCATION
044A	0	1.8	1.807	2019	19000	2018	0.2	2.4	1.37	9	0.78	1.07	460	34333	34333	ON SH 44 104TH AVE W/O SH 2 SABLE BLVD COMMERCE CITY

100th and Havana Traffic Study

Station ID	2018 AADT	2040 AADT	Growth Factor	Yearly Growth Rate
102106	19000	26733	1.37	1.44%

APPENDIX C

Trip Generation Worksheets

Project 100th and Havana

Subject Trip Generation for Industrial Park

Designed by TES

Date April 13, 2020

Job No. 096441009

Checked by

Date

Sheet No. of

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 10th Edition, Average Rate Equations

Land Use Code - Industrial Park (130)

Independant Variable - 1000 Square Feet Gross Floor Feet (X)

Gross Floor Area = 302,500

X = 302.5

T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (100 Series Page 22)

T = 0.40 (X)

T = 0.40 * 302.5

Directional Distribution: 81% ent. 19% exit.

T = 121 Average Vehicle Trip Ends

98 entering 23 exiting

98 + 23 = 121

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (100 Series Page 23)

T = 0.40 (X)

T = 0.40 * 302.5

Directional Distribution: 21% ent. 79% exit.

T = 121 Average Vehicle Trip Ends

25 entering 96 exiting

25 + 96 = 121

Weekday (100 Series Page 21)

T = 3.37 (X)

T = 3.37 * 302.5

Directional Distribution: 50% entering, 50% exiting

T = 1020 Average Vehicle Trip Ends

510 entering 510 exiting

510 + 510 = 1020

APPENDIX D

Intersection Analysis Worksheets

Timings

1: Joliet Ave & 104th Ave

2020 Existing AM.syn

08/25/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	785	125	110	870	30	35	10	0
Future Volume (vph)	5	785	125	110	870	30	35	10	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	Perm	pm+pt	NA
Protected Phases	5	2		1	6	3		7	4
Permitted Phases	2		2	6		8	8	4	
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	4.0	5.0	4.0	5.0
Minimum Split (s)	9.0	30.0	30.0	9.0	32.0	9.0	37.0	9.0	39.0
Total Split (s)	9.0	39.0	39.0	9.0	39.0	12.0	13.0	9.0	10.0
Total Split (%)	12.9%	55.7%	55.7%	12.9%	55.7%	17.1%	18.6%	12.9%	14.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	46.6	41.2	41.2	51.1	50.5	9.4	8.1	6.2	5.0
Actuated g/C Ratio	0.67	0.59	0.59	0.73	0.72	0.13	0.12	0.09	0.07
v/c Ratio	0.02	0.41	0.14	0.35	0.39	0.21	0.16	0.12	0.06
Control Delay	5.0	10.2	1.3	6.9	7.1	26.0	0.8	24.7	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	10.2	1.3	6.9	7.1	26.0	0.8	24.7	0.4
LOS	A	B	A	A	A	C	A	C	A
Approach Delay		8.9			7.1				12.6
Approach LOS		A			A				B

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 57 (81%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.41

Intersection Signal Delay: 8.1

Intersection LOS: A

Intersection Capacity Utilization 49.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Joliet Ave & 104th Ave



HCM 6th Signalized Intersection Summary

2020 Existing AM.syn

1: Joliet Ave & 104th Ave

08/25/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	785	125	110	870	5	30	0	35	10	0	5
Future Volume (veh/h)	5	785	125	110	870	5	30	0	35	10	0	5
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	7	844	144	153	967	20	43	0	70	20	0	20
Peak Hour Factor	0.75	0.93	0.87	0.72	0.90	0.25	0.69	0.92	0.50	0.50	0.92	0.25
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	371	1946	868	436	2127	44	232	144	122	220	0	100
Arrive On Green	0.01	0.55	0.55	0.06	0.60	0.60	0.03	0.00	0.08	0.02	0.00	0.06
Sat Flow, veh/h	1781	3554	1585	1781	3560	74	1781	1870	1585	1781	0	1585
Grp Volume(v), veh/h	7	844	144	153	483	504	43	0	70	20	0	20
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1857	1781	1870	1585	1781	0	1585
Q Serve(g_s), s	0.1	9.9	3.2	2.6	10.5	10.5	1.6	0.0	3.0	0.7	0.0	0.8
Cycle Q Clear(g_c), s	0.1	9.9	3.2	2.6	10.5	10.5	1.6	0.0	3.0	0.7	0.0	0.8
Prop In Lane	1.00		1.00	1.00		0.04	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	371	1946	868	436	1061	1109	232	144	122	220	0	100
V/C Ratio(X)	0.02	0.43	0.17	0.35	0.45	0.45	0.19	0.00	0.57	0.09	0.00	0.20
Avail Cap(c_a), veh/h	460	1946	868	436	1061	1109	352	214	181	288	0	113
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.3	9.4	7.9	6.8	7.8	7.8	29.4	0.0	31.2	29.9	0.0	31.1
Incr Delay (d2), s/veh	0.0	0.7	0.4	0.2	1.4	1.3	0.1	0.0	1.6	0.1	0.0	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	0.0	3.5	1.0	0.8	3.7	3.8	0.7	0.0	1.2	0.3	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.3	10.1	8.3	7.0	9.2	9.1	29.5	0.0	32.8	29.9	0.0	31.5
LnGrp LOS	A	B	A	A	A	A	C	A	C	C	A	C
Approach Vol, veh/h	995				1140				113			
Approach Delay, s/veh	9.8				8.9				31.5			
Approach LOS	A				A				C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.0	44.3	7.3	9.4	5.5	47.8	6.3	10.4				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	4.0	33.0	7.0	5.0	4.0	33.0	4.0	8.0				
Max Q Clear Time (g_c+l1), s	4.6	11.9	3.6	2.8	2.1	12.5	2.7	5.0				
Green Ext Time (p_c), s	0.0	13.2	0.0	0.0	0.0	13.2	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 10.8

HCM 6th LOS B

Notes

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

Timings

1: Joliet Ave & 104th Ave

2020 Existing PM.syn

08/25/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	50	920	40	35	880	80	105	5	0
Future Volume (vph)	50	920	40	35	880	80	105	5	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	Perm	pm+pt	NA
Protected Phases	5	2		1	6	3		7	4
Permitted Phases	2		2	6		8	8	4	
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	4.0	14.0	14.0	4.0	14.0	4.0	5.0	4.0	5.0
Minimum Split (s)	9.0	20.0	20.0	9.0	20.0	9.0	37.0	9.0	10.0
Total Split (s)	9.0	35.0	35.0	9.0	35.0	16.0	15.0	11.0	10.0
Total Split (%)	12.9%	50.0%	50.0%	12.9%	50.0%	22.9%	21.4%	15.7%	14.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	46.9	44.0	44.0	45.7	41.9	12.2	10.1	6.9	5.0
Actuated g/C Ratio	0.67	0.63	0.63	0.65	0.60	0.17	0.14	0.10	0.07
v/c Ratio	0.27	0.46	0.05	0.18	0.46	0.43	0.26	0.06	0.10
Control Delay	7.6	11.9	0.1	7.0	12.5	28.1	1.3	21.0	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.6	11.9	0.1	7.0	12.5	28.1	1.3	21.0	0.6
LOS	A	B	A	A	B	C	A	C	A
Approach Delay		11.0			12.2				5.1
Approach LOS		B			B				A

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 8 (11%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.46

Intersection Signal Delay: 11.7

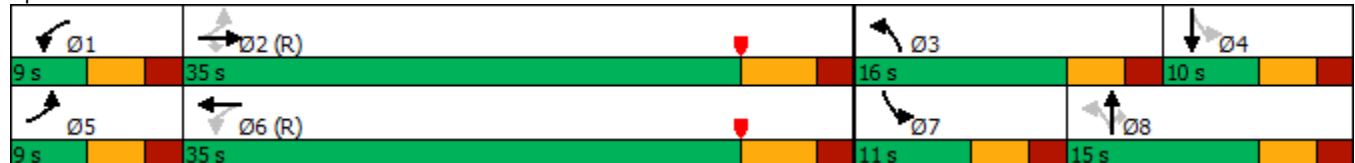
Intersection LOS: B

Intersection Capacity Utilization 53.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Joliet Ave & 104th Ave



HCM 6th Signalized Intersection Summary

2020 Existing PM.syn

1: Joliet Ave & 104th Ave

08/25/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	920	40	35	880	5	80	0	105	5	0	15
Future Volume (veh/h)	50	920	40	35	880	5	80	0	105	5	0	15
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	100	1022	53	65	957	20	111	0	127	10	0	35
Peak Hour Factor	0.50	0.90	0.75	0.54	0.92	0.25	0.72	0.92	0.83	0.50	0.92	0.43
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	378	1831	815	343	1805	38	302	250	212	208	0	109
Arrive On Green	0.05	0.52	0.52	0.04	0.51	0.51	0.07	0.00	0.13	0.01	0.00	0.07
Sat Flow, veh/h	1781	3554	1582	1781	3559	74	1781	1870	1585	1781	0	1585
Grp Volume(v), veh/h	100	1022	53	65	478	499	111	0	127	10	0	35
Grp Sat Flow(s),veh/h/ln	1781	1777	1582	1781	1777	1857	1781	1870	1585	1781	0	1585
Q Serve(g_s), s	1.8	13.7	1.2	1.2	12.7	12.7	3.9	0.0	5.3	0.4	0.0	1.5
Cycle Q Clear(g_c), s	1.8	13.7	1.2	1.2	12.7	12.7	3.9	0.0	5.3	0.4	0.0	1.5
Prop In Lane	1.00		1.00	1.00		0.04	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	378	1831	815	343	901	942	302	250	212	208	0	109
V/C Ratio(X)	0.26	0.56	0.07	0.19	0.53	0.53	0.37	0.00	0.60	0.05	0.00	0.32
Avail Cap(c_a), veh/h	392	1831	815	372	901	942	449	267	226	343	0	113
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.7	11.6	8.5	8.8	11.6	11.6	26.0	0.0	28.5	29.9	0.0	31.0
Incr Delay (d2), s/veh	0.1	1.2	0.2	0.1	2.2	2.1	0.3	0.0	2.4	0.0	0.0	0.6
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	0.6	5.0	0.4	0.4	4.9	5.1	1.6	0.0	2.1	0.2	0.0	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.8	12.8	8.7	8.9	13.9	13.8	26.3	0.0	31.0	29.9	0.0	31.7
LnGrp LOS	A	B	A	A	B	B	C	A	C	C	A	C
Approach Vol, veh/h	1175		1042				238		45			
Approach Delay, s/veh	12.3		13.5				28.8		31.3			
Approach LOS	B		B				C		C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.9	42.1	10.2	9.8	8.4	41.5	5.7	14.4				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	4.0	29.0	11.0	5.0	4.0	29.0	6.0	10.0				
Max Q Clear Time (g_c+l1), s	3.2	15.7	5.9	3.5	3.8	14.7	2.4	7.3				
Green Ext Time (p_c), s	0.0	10.1	0.1	0.0	0.0	9.9	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	14.7											
HCM 6th LOS	B											
Notes												
User approved pedestrian interval to be less than phase max green.												

Timings

2022 Background AM.syn

1: Joliet Ave & 104th Ave

08/25/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	805	130	115	895	30	35	10	0
Future Volume (vph)	5	805	130	115	895	30	35	10	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	Perm	pm+pt	NA
Protected Phases	5	2		1	6	3		7	4
Permitted Phases	2		2	6		8	8	4	
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	4.0	5.0	4.0	5.0
Minimum Split (s)	9.0	30.0	30.0	9.0	32.0	9.0	37.0	9.0	39.0
Total Split (s)	9.0	39.0	39.0	9.0	39.0	12.0	13.0	9.0	10.0
Total Split (%)	12.9%	55.7%	55.7%	12.9%	55.7%	17.1%	18.6%	12.9%	14.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	46.6	41.2	41.2	51.1	50.5	9.4	8.1	6.2	5.0
Actuated g/C Ratio	0.67	0.59	0.59	0.73	0.72	0.13	0.12	0.09	0.07
v/c Ratio	0.02	0.42	0.15	0.37	0.40	0.21	0.17	0.12	0.06
Control Delay	5.0	10.3	1.4	7.3	7.2	26.0	0.9	24.7	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	10.3	1.4	7.3	7.2	26.0	0.9	24.7	0.4
LOS	A	B	A	A	A	C	A	C	A
Approach Delay		9.0			7.2				12.6
Approach LOS		A			A				B

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 57 (81%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 8.2

Intersection LOS: A

Intersection Capacity Utilization 50.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Joliet Ave & 104th Ave



HCM 6th Signalized Intersection Summary

2022 Background AM.syn

1: Joliet Ave & 104th Ave

08/25/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	805	130	115	895	5	30	0	35	10	0	5
Future Volume (veh/h)	5	805	130	115	895	5	30	0	35	10	0	5
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	7	866	149	160	994	20	43	0	70	20	0	20
Peak Hour Factor	0.75	0.93	0.87	0.72	0.90	0.25	0.69	0.92	0.50	0.50	0.92	0.25
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	361	1946	868	428	2128	43	232	144	122	220	0	100
Arrive On Green	0.01	0.55	0.55	0.06	0.60	0.60	0.03	0.00	0.08	0.02	0.00	0.06
Sat Flow, veh/h	1781	3554	1585	1781	3563	72	1781	1870	1585	1781	0	1585
Grp Volume(v), veh/h	7	866	149	160	496	518	43	0	70	20	0	20
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1857	1781	1870	1585	1781	0	1585
Q Serve(g_s), s	0.1	10.2	3.3	2.7	10.9	10.9	1.6	0.0	3.0	0.7	0.0	0.8
Cycle Q Clear(g_c), s	0.1	10.2	3.3	2.7	10.9	10.9	1.6	0.0	3.0	0.7	0.0	0.8
Prop In Lane	1.00		1.00	1.00		0.04	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	361	1946	868	428	1061	1110	232	144	122	220	0	100
V/C Ratio(X)	0.02	0.45	0.17	0.37	0.47	0.47	0.19	0.00	0.57	0.09	0.00	0.20
Avail Cap(c_a), veh/h	450	1946	868	428	1061	1110	352	214	181	288	0	113
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.4	9.5	7.9	6.9	7.9	7.9	29.4	0.0	31.2	29.9	0.0	31.1
Incr Delay (d2), s/veh	0.0	0.7	0.4	0.2	1.5	1.4	0.1	0.0	1.6	0.1	0.0	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	0.0	3.6	1.1	0.8	3.8	4.0	0.7	0.0	1.2	0.3	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.4	10.2	8.3	7.2	9.3	9.3	29.5	0.0	32.8	29.9	0.0	31.5
LnGrp LOS	A	B	A	A	A	A	C	A	C	C	A	C
Approach Vol, veh/h	1022		1174				113		40			
Approach Delay, s/veh	9.9		9.0				31.5		30.7			
Approach LOS	A		A				C		C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.0	44.3	7.3	9.4	5.5	47.8	6.3	10.4				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	4.0	33.0	7.0	5.0	4.0	33.0	4.0	8.0				
Max Q Clear Time (g_c+l1), s	4.7	12.2	3.6	2.8	2.1	12.9	2.7	5.0				
Green Ext Time (p_c), s	0.0	13.4	0.0	0.0	0.0	13.3	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	10.9											
HCM 6th LOS	B											
Notes												

Timings

2022 Background PM.syn

1: Joliet Ave & 104th Ave

08/25/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	55	945	40	35	905	85	105	5	0
Future Volume (vph)	55	945	40	35	905	85	105	5	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	Perm	pm+pt	NA
Protected Phases	5	2		1	6	3		7	4
Permitted Phases	2		2	6		8	8	4	
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	4.0	14.0	14.0	4.0	14.0	4.0	5.0	4.0	5.0
Minimum Split (s)	9.0	20.0	20.0	9.0	20.0	9.0	37.0	9.0	10.0
Total Split (s)	9.0	35.0	35.0	9.0	35.0	16.0	15.0	11.0	10.0
Total Split (%)	12.9%	50.0%	50.0%	12.9%	50.0%	22.9%	21.4%	15.7%	14.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	46.8	43.9	43.9	45.5	41.8	12.4	10.2	6.9	5.0
Actuated g/C Ratio	0.67	0.63	0.63	0.65	0.60	0.18	0.15	0.10	0.07
v/c Ratio	0.31	0.47	0.05	0.19	0.48	0.45	0.26	0.06	0.11
Control Delay	8.1	12.1	0.1	7.1	12.8	28.4	1.3	20.8	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	12.1	0.1	7.1	12.8	28.4	1.3	20.8	0.7
LOS	A	B	A	A	B	C	A	C	A
Approach Delay		11.2			12.4				5.1
Approach LOS		B			B				A

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 8 (11%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 11.9

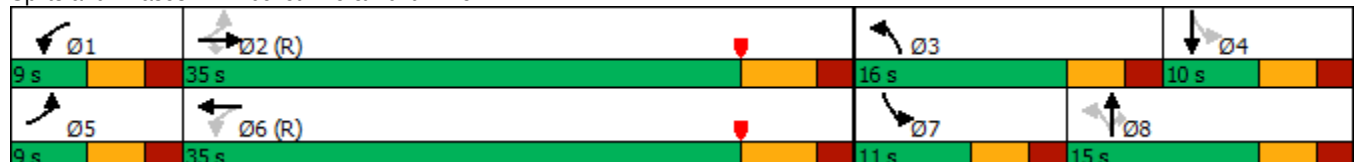
Intersection LOS: B

Intersection Capacity Utilization 54.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Joliet Ave & 104th Ave



HCM 6th Signalized Intersection Summary

2022 Background PM.syn

1: Joliet Ave & 104th Ave

08/25/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	945	40	35	905	5	85	0	105	5	0	15
Future Volume (veh/h)	55	945	40	35	905	5	85	0	105	5	0	15
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	110	1050	53	65	984	20	118	0	127	10	0	35
Peak Hour Factor	0.50	0.90	0.75	0.54	0.92	0.25	0.72	0.92	0.83	0.50	0.92	0.43
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	368	1816	808	332	1784	36	310	258	219	208	0	109
Arrive On Green	0.05	0.51	0.51	0.04	0.50	0.50	0.08	0.00	0.14	0.01	0.00	0.07
Sat Flow, veh/h	1781	3554	1582	1781	3562	72	1781	1870	1585	1781	0	1585
Grp Volume(v), veh/h	110	1050	53	65	491	513	118	0	127	10	0	35
Grp Sat Flow(s),veh/h/ln	1781	1777	1582	1781	1777	1857	1781	1870	1585	1781	0	1585
Q Serve(g_s), s	2.1	14.4	1.2	1.2	13.3	13.3	4.1	0.0	5.3	0.4	0.0	1.5
Cycle Q Clear(g_c), s	2.1	14.4	1.2	1.2	13.3	13.3	4.1	0.0	5.3	0.4	0.0	1.5
Prop In Lane	1.00		1.00	1.00		0.04	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	368	1816	808	332	890	930	310	258	219	208	0	109
V/C Ratio(X)	0.30	0.58	0.07	0.20	0.55	0.55	0.38	0.00	0.58	0.05	0.00	0.32
Avail Cap(c_a), veh/h	379	1816	808	361	890	930	449	267	226	343	0	113
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.1	11.9	8.7	9.2	12.1	12.1	25.6	0.0	28.3	29.9	0.0	31.0
Incr Delay (d2), s/veh	0.2	1.3	0.2	0.1	2.5	2.4	0.3	0.0	2.2	0.0	0.0	0.6
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	0.7	5.3	0.4	0.4	5.2	5.4	1.7	0.0	2.0	0.2	0.0	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.2	13.2	8.8	9.3	14.5	14.4	25.9	0.0	30.4	29.9	0.0	31.7
LnGrp LOS	A	B	A	A	B	B	C	A	C	C	A	C
Approach Vol, veh/h	1213		1069				245		45			
Approach Delay, s/veh	12.7		14.1				28.3		31.3			
Approach LOS	B		B				C		C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.9	41.8	10.5	9.8	8.6	41.1	5.7	14.7				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	4.0	29.0	11.0	5.0	4.0	29.0	6.0	10.0				
Max Q Clear Time (g_c+1), s	3.2	16.4	6.1	3.5	4.1	15.3	2.4	7.3				
Green Ext Time (p_c), s	0.0	9.8	0.1	0.0	0.0	9.8	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 15.1

HCM 6th LOS B

Notes

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

Timings

1: Joliet Ave & 104th Ave

2022 Total AM.syn

09/08/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	5	805	150	125	895	35	40	10	0
Future Volume (vph)	5	805	150	125	895	35	40	10	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	Perm	pm+pt	NA
Protected Phases	5	2		1	6	3		7	4
Permitted Phases	2		2	6		8	8	4	
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	4.0	5.0	4.0	5.0
Minimum Split (s)	9.0	30.0	30.0	9.0	32.0	9.0	37.0	9.0	39.0
Total Split (s)	9.0	39.0	39.0	9.0	39.0	12.0	13.0	9.0	10.0
Total Split (%)	12.9%	55.7%	55.7%	12.9%	55.7%	17.1%	18.6%	12.9%	14.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	46.4	41.1	41.1	51.0	50.4	9.6	8.2	6.2	5.0
Actuated g/C Ratio	0.66	0.59	0.59	0.73	0.72	0.14	0.12	0.09	0.07
v/c Ratio	0.02	0.42	0.17	0.41	0.40	0.25	0.19	0.12	0.06
Control Delay	5.2	10.4	2.1	8.0	7.3	26.6	1.0	24.7	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.2	10.4	2.1	8.0	7.3	26.6	1.0	24.7	0.4
LOS	A	B	A	A	A	C	A	C	A
Approach Delay		9.0			7.4				12.6
Approach LOS		A			A				B

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 57 (81%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 8.4

Intersection LOS: A

Intersection Capacity Utilization 51.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Joliet Ave & 104th Ave



HCM 6th Signalized Intersection Summary

2022 Total AM.syn

1: Joliet Ave & 104th Ave

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	805	150	125	895	5	35	0	40	10	0	5
Future Volume (veh/h)	5	805	150	125	895	5	35	0	40	10	0	5
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	7	866	172	174	994	20	51	0	80	20	0	20
Peak Hour Factor	0.75	0.93	0.87	0.72	0.90	0.25	0.69	0.92	0.50	0.50	0.92	0.25
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	357	1928	860	419	2110	42	240	153	130	221	0	102
Arrive On Green	0.01	0.54	0.54	0.06	0.59	0.59	0.04	0.00	0.08	0.02	0.00	0.06
Sat Flow, veh/h	1781	3554	1585	1781	3563	72	1781	1870	1585	1781	0	1585
Grp Volume(v), veh/h	7	866	172	174	496	518	51	0	80	20	0	20
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1857	1781	1870	1585	1781	0	1585
Q Serve(g_s), s	0.1	10.3	3.9	3.0	11.0	11.0	1.9	0.0	3.4	0.7	0.0	0.8
Cycle Q Clear(g_c), s	0.1	10.3	3.9	3.0	11.0	11.0	1.9	0.0	3.4	0.7	0.0	0.8
Prop In Lane	1.00		1.00	1.00		0.04	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	357	1928	860	419	1052	1100	240	153	130	221	0	102
V/C Ratio(X)	0.02	0.45	0.20	0.41	0.47	0.47	0.21	0.00	0.62	0.09	0.00	0.20
Avail Cap(c_a), veh/h	446	1928	860	419	1052	1100	354	214	181	290	0	113
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.5	9.7	8.2	7.2	8.1	8.1	29.2	0.0	31.1	29.8	0.0	31.0
Incr Delay (d2), s/veh	0.0	0.8	0.5	0.2	1.5	1.4	0.2	0.0	1.8	0.1	0.0	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	0.0	3.6	1.3	0.9	3.9	4.1	0.8	0.0	1.3	0.3	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.5	10.4	8.7	7.5	9.6	9.5	29.3	0.0	32.8	29.8	0.0	31.4
LnGrp LOS	A	B	A	A	A	A	C	A	C	C	A	C
Approach Vol, veh/h	1045		1188				131		40			
Approach Delay, s/veh	10.1		9.2				31.5		30.6			
Approach LOS	B		A				C		C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.0	44.0	7.5	9.5	5.5	47.5	6.3	10.7				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	4.0	33.0	7.0	5.0	4.0	33.0	4.0	8.0				
Max Q Clear Time (g_c+I1), s	5.0	12.3	3.9	2.8	2.1	13.0	2.7	5.4				
Green Ext Time (p_c), s	0.0	13.5	0.0	0.0	0.0	13.3	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			11.2									
HCM 6th LOS			B									
Notes												

Timings

1: Joliet Ave & 104th Ave

2022 Total PM.syn

09/08/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	55	945	45	40	905	105	115	5	0
Future Volume (vph)	55	945	45	40	905	105	115	5	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	Perm	pm+pt	NA
Protected Phases	5	2		1	6	3		7	4
Permitted Phases	2		2	6		8	8	4	
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	4.0	14.0	14.0	4.0	14.0	4.0	5.0	4.0	5.0
Minimum Split (s)	9.0	20.0	20.0	9.0	20.0	9.0	37.0	9.0	10.0
Total Split (s)	9.0	35.0	35.0	9.0	35.0	16.0	15.0	11.0	10.0
Total Split (%)	12.9%	50.0%	50.0%	12.9%	50.0%	22.9%	21.4%	15.7%	14.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	45.3	41.5	41.5	44.9	41.4	13.1	10.8	6.9	5.0
Actuated g/C Ratio	0.65	0.59	0.59	0.64	0.59	0.19	0.15	0.10	0.07
v/c Ratio	0.32	0.50	0.06	0.23	0.48	0.52	0.28	0.06	0.11
Control Delay	8.5	13.3	0.1	7.8	13.0	29.9	1.4	20.8	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	13.3	0.1	7.8	13.0	29.9	1.4	20.8	0.7
LOS	A	B	A	A	B	C	A	C	A
Approach Delay		12.2			12.7				5.2
Approach LOS		B			B				A

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 8 (11%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 12.7

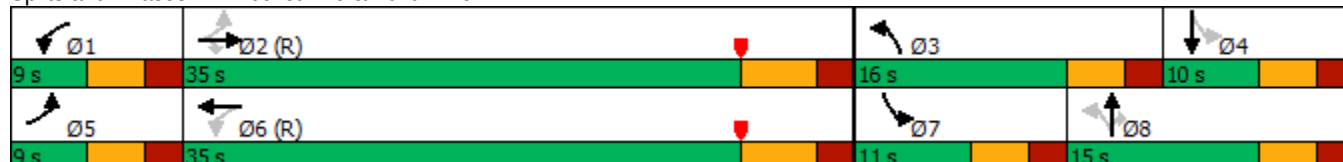
Intersection LOS: B

Intersection Capacity Utilization 55.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Joliet Ave & 104th Ave



HCM 6th Signalized Intersection Summary

2022 Total PM.syn

1: Joliet Ave & 104th Ave

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	945	45	40	905	5	105	0	115	5	0	15
Future Volume (veh/h)	55	945	45	40	905	5	105	0	115	5	0	15
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	110	1050	60	74	984	20	146	0	139	10	0	35
Peak Hour Factor	0.50	0.90	0.75	0.54	0.92	0.25	0.72	0.92	0.83	0.50	0.92	0.43
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	356	1746	777	322	1719	35	340	290	246	208	0	110
Arrive On Green	0.05	0.49	0.49	0.04	0.48	0.48	0.10	0.00	0.15	0.01	0.00	0.07
Sat Flow, veh/h	1781	3554	1582	1781	3562	72	1781	1870	1585	1781	0	1585
Grp Volume(v), veh/h	110	1050	60	74	491	513	146	0	139	10	0	35
Grp Sat Flow(s),veh/h/ln	1781	1777	1582	1781	1777	1857	1781	1870	1585	1781	0	1585
Q Serve(g_s), s	2.1	14.9	1.4	1.4	13.8	13.8	5.0	0.0	5.7	0.4	0.0	1.5
Cycle Q Clear(g_c), s	2.1	14.9	1.4	1.4	13.8	13.8	5.0	0.0	5.7	0.4	0.0	1.5
Prop In Lane	1.00		1.00	1.00		0.04	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	356	1746	777	322	858	897	340	290	246	208	0	110
V/C Ratio(X)	0.31	0.60	0.08	0.23	0.57	0.57	0.43	0.00	0.57	0.05	0.00	0.32
Avail Cap(c_a), veh/h	365	1746	777	346	858	897	449	290	246	342	0	113
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.8	12.9	9.4	9.9	12.9	12.9	24.9	0.0	27.4	29.8	0.0	31.0
Incr Delay (d2), s/veh	0.2	1.5	0.2	0.1	2.8	2.6	0.3	0.0	1.9	0.0	0.0	0.6
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	0.7	5.6	0.5	0.5	5.5	5.7	2.1	0.0	2.2	0.2	0.0	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.9	14.4	9.6	10.0	15.7	15.6	25.2	0.0	29.3	29.9	0.0	31.6
LnGrp LOS	A	B	A	B	B	B	C	A	C	C	A	C
Approach Vol, veh/h	1220		1078			285			45			
Approach Delay, s/veh	13.8		15.3			27.2			31.2			
Approach LOS	B		B			C			C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.1	40.4	11.7	9.9	8.7	39.8	5.7	15.8				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	4.0	29.0	11.0	5.0	4.0	29.0	6.0	10.0				
Max Q Clear Time (g_c+I1), s	3.4	16.9	7.0	3.5	4.1	15.8	2.4	7.7				
Green Ext Time (p_c), s	0.0	9.4	0.1	0.0	0.0	9.5	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	16.1											
HCM 6th LOS	B											
Notes												

Timings

2040 Background AM.syn

1: Joliet Ave & 104th Ave

08/25/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	10	1045	165	145	1155	35	45	10	0
Future Volume (vph)	10	1045	165	145	1155	35	45	10	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	Perm	pm+pt	NA
Protected Phases	5	2		1	6	3		7	4
Permitted Phases	2		2	6		8	8	4	
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	4.0	5.0	4.0	5.0
Minimum Split (s)	9.0	30.0	30.0	9.0	32.0	9.0	37.0	9.0	39.0
Total Split (s)	9.0	39.0	39.0	9.0	39.0	12.0	13.0	9.0	10.0
Total Split (%)	12.9%	55.7%	55.7%	12.9%	55.7%	17.1%	18.6%	12.9%	14.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	50.3	44.8	44.8	55.3	55.9	7.4	5.9	5.2	5.0
Actuated g/C Ratio	0.72	0.64	0.64	0.79	0.80	0.11	0.08	0.07	0.07
v/c Ratio	0.03	0.50	0.17	0.43	0.45	0.20	0.14	0.08	0.02
Control Delay	4.2	9.5	2.0	8.7	6.4	28.2	0.8	26.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.2	9.5	2.0	8.7	6.4	28.2	0.8	26.8	0.0
LOS	A	A	A	A	A	C	A	C	A
Approach Delay		8.4			6.6				18.4
Approach LOS		A			A				B

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 57 (81%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 7.7

Intersection LOS: A

Intersection Capacity Utilization 58.9%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Joliet Ave & 104th Ave



HCM 6th Signalized Intersection Summary

2040 Background AM.syn

1: Joliet Ave & 104th Ave

08/25/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	1045	165	145	1155	5	35	0	45	10	0	5
Future Volume (veh/h)	10	1045	165	145	1155	5	35	0	45	10	0	5
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	11	1124	179	158	1255	5	38	0	49	11	0	5
Peak Hour Factor	0.92	0.93	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	299	1996	890	356	2207	9	224	131	111	192	0	81
Arrive On Green	0.01	0.56	0.56	0.06	0.61	0.61	0.03	0.00	0.07	0.01	0.00	0.05
Sat Flow, veh/h	1781	3554	1585	1781	3630	14	1781	1870	1585	1781	0	1585
Grp Volume(v), veh/h	11	1124	179	158	614	646	38	0	49	11	0	5
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1868	1781	1870	1585	1781	0	1585
Q Serve(g_s), s	0.2	14.2	3.9	2.6	14.5	14.5	1.4	0.0	2.1	0.4	0.0	0.2
Cycle Q Clear(g_c), s	0.2	14.2	3.9	2.6	14.5	14.5	1.4	0.0	2.1	0.4	0.0	0.2
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	299	1996	890	356	1080	1135	224	131	111	192	0	81
V/C Ratio(X)	0.04	0.56	0.20	0.44	0.57	0.57	0.17	0.00	0.44	0.06	0.00	0.06
Avail Cap(c_a), veh/h	381	1996	890	356	1080	1135	349	214	181	274	0	113
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.4	9.8	7.6	7.9	8.2	8.2	30.2	0.0	31.2	31.0	0.0	31.6
Incr Delay (d2), s/veh	0.0	1.2	0.5	0.3	2.2	2.1	0.1	0.0	1.0	0.0	0.0	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	0.1	4.9	1.3	0.8	5.1	5.3	0.6	0.0	0.8	0.2	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.4	11.0	8.1	8.2	10.4	10.3	30.3	0.0	32.3	31.0	0.0	31.7
LnGrp LOS	A	B	A	A	B	B	C	A	C	C	A	C
Approach Vol, veh/h		1314			1418			87			16	
Approach Delay, s/veh		10.6			10.1			31.4			31.2	
Approach LOS		B			B			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.0	45.3	7.1	8.6	5.8	48.6	5.8	9.9				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	4.0	33.0	7.0	5.0	4.0	33.0	4.0	8.0				
Max Q Clear Time (g_c+I1), s	4.6	16.2	3.4	2.2	2.2	16.5	2.4	4.1				
Green Ext Time (p_c), s	0.0	13.6	0.0	0.0	0.0	13.4	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			11.1									
HCM 6th LOS			B									
Notes												
User approved pedestrian interval to be less than phase max green.												

Timings

1: Joliet Ave & 104th Ave

2040 Background PM.syn

08/25/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	65	1225	50	45	1175	110	135	5	0
Future Volume (vph)	65	1225	50	45	1175	110	135	5	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	Perm	pm+pt	NA
Protected Phases	5	2		1	6	3		7	4
Permitted Phases	2		2	6		8	8	4	
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	4.0	14.0	14.0	4.0	14.0	4.0	5.0	4.0	5.0
Minimum Split (s)	9.0	20.0	20.0	9.0	20.0	9.0	37.0	9.0	10.0
Total Split (s)	9.0	35.0	35.0	9.0	35.0	16.0	15.0	11.0	10.0
Total Split (%)	12.9%	50.0%	50.0%	12.9%	50.0%	22.9%	21.4%	15.7%	14.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	46.7	43.9	43.9	45.6	41.9	12.4	10.3	6.7	5.0
Actuated g/C Ratio	0.67	0.63	0.63	0.65	0.60	0.18	0.15	0.10	0.07
v/c Ratio	0.28	0.60	0.05	0.20	0.61	0.45	0.31	0.03	0.07
Control Delay	8.8	14.8	0.1	7.8	15.3	28.5	1.7	20.2	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	14.8	0.1	7.8	15.3	28.5	1.7	20.2	0.5
LOS	A	B	A	A	B	C	A	C	A
Approach Delay		13.9			15.0				4.1
Approach LOS		B			B				A

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 8 (11%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 14.3

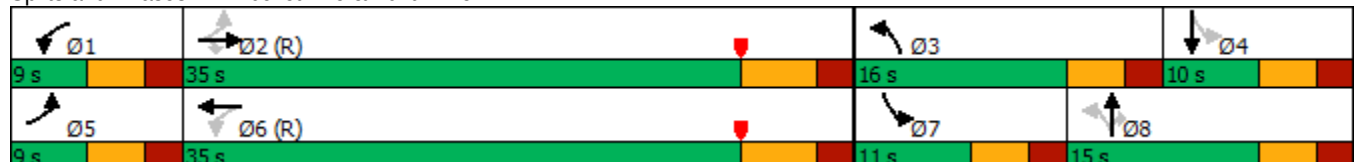
Intersection LOS: B

Intersection Capacity Utilization 63.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Joliet Ave & 104th Ave



HCM 6th Signalized Intersection Summary

2040 Background PM.syn

1: Joliet Ave & 104th Ave

08/25/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	1225	50	45	1175	5	110	0	135	5	0	20
Future Volume (veh/h)	65	1225	50	45	1175	5	110	0	135	5	0	20
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	71	1332	54	49	1277	5	120	0	147	5	0	22
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	283	1833	816	253	1844	7	323	269	228	198	0	109
Arrive On Green	0.04	0.52	0.52	0.04	0.51	0.51	0.08	0.00	0.14	0.01	0.00	0.07
Sat Flow, veh/h	1781	3554	1582	1781	3630	14	1781	1870	1585	1781	0	1585
Grp Volume(v), veh/h	71	1332	54	49	625	657	120	0	147	5	0	22
Grp Sat Flow(s),veh/h/ln	1781	1777	1582	1781	1777	1868	1781	1870	1585	1781	0	1585
Q Serve(g_s), s	1.3	20.3	1.2	0.9	18.7	18.7	4.2	0.0	6.1	0.2	0.0	0.9
Cycle Q Clear(g_c), s	1.3	20.3	1.2	0.9	18.7	18.7	4.2	0.0	6.1	0.2	0.0	0.9
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	283	1833	816	253	903	949	323	269	228	198	0	109
V/C Ratio(X)	0.25	0.73	0.07	0.19	0.69	0.69	0.37	0.00	0.64	0.03	0.00	0.20
Avail Cap(c_a), veh/h	309	1833	816	293	903	949	460	269	228	341	0	113
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.3	13.1	8.5	10.7	13.1	13.1	25.4	0.0	28.3	30.1	0.0	30.8
Incr Delay (d2), s/veh	0.2	2.6	0.2	0.1	4.4	4.1	0.3	0.0	4.8	0.0	0.0	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	0.4	7.6	0.4	0.3	7.5	7.9	1.7	0.0	2.5	0.1	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.5	15.7	8.7	10.8	17.4	17.2	25.7	0.0	33.1	30.1	0.0	31.1
LnGrp LOS	B	B	A	B	B	B	C	A	C	C	A	C
Approach Vol, veh/h	1457				1331		267				27	
Approach Delay, s/veh	15.2				17.1		29.8				30.9	
Approach LOS	B				B		C				C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.5	42.1	10.6	9.8	8.0	41.6	5.4	15.1				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	4.0	29.0	11.0	5.0	4.0	29.0	6.0	10.0				
Max Q Clear Time (g_c+l1), s	2.9	22.3	6.2	2.9	3.3	20.7	2.2	8.1				
Green Ext Time (p_c), s	0.0	6.1	0.1	0.0	0.0	7.3	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 17.4

HCM 6th LOS B

Notes

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

Timings

1: Joliet Ave & 104th Ave

2040 Total AM.syn

09/08/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	10	1045	185	155	1155	40	50	10	0
Future Volume (vph)	10	1045	185	155	1155	40	50	10	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	Perm	pm+pt	NA
Protected Phases	5	2		1	6	3		7	4
Permitted Phases	2		2	6		8	8	4	
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	4.0	5.0	4.0	5.0
Minimum Split (s)	9.0	30.0	30.0	9.0	32.0	9.0	37.0	9.0	39.0
Total Split (s)	9.0	39.0	39.0	9.0	39.0	12.0	13.0	9.0	10.0
Total Split (%)	12.9%	55.7%	55.7%	12.9%	55.7%	17.1%	18.6%	12.9%	14.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	49.8	44.3	44.3	55.0	55.6	7.5	6.2	5.0	5.0
Actuated g/C Ratio	0.71	0.63	0.63	0.79	0.79	0.11	0.09	0.07	0.07
v/c Ratio	0.03	0.50	0.19	0.46	0.45	0.23	0.15	0.09	0.02
Control Delay	4.3	9.8	2.1	10.1	6.5	28.8	0.9	27.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.3	9.8	2.1	10.1	6.5	28.8	0.9	27.0	0.0
LOS	A	A	A	B	A	C	A	C	A
Approach Delay		8.6			6.9				18.6
Approach LOS		A			A				B

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 57 (81%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 8.0

Intersection LOS: A

Intersection Capacity Utilization 59.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Joliet Ave & 104th Ave



HCM 6th Signalized Intersection Summary

2040 Total AM.syn

1: Joliet Ave & 104th Ave

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	1045	185	155	1155	5	40	0	50	10	0	5
Future Volume (veh/h)	10	1045	185	155	1155	5	40	0	50	10	0	5
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	11	1124	201	168	1255	5	43	0	54	11	0	5
Peak Hour Factor	0.92	0.93	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	296	1981	883	351	2191	9	231	139	118	194	0	84
Arrive On Green	0.01	0.56	0.56	0.06	0.60	0.60	0.03	0.00	0.07	0.01	0.00	0.05
Sat Flow, veh/h	1781	3554	1585	1781	3630	14	1781	1870	1585	1781	0	1585
Grp Volume(v), veh/h	11	1124	201	168	614	646	43	0	54	11	0	5
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1868	1781	1870	1585	1781	0	1585
Q Serve(g_s), s	0.2	14.3	4.5	2.8	14.7	14.7	1.6	0.0	2.3	0.4	0.0	0.2
Cycle Q Clear(g_c), s	0.2	14.3	4.5	2.8	14.7	14.7	1.6	0.0	2.3	0.4	0.0	0.2
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	296	1981	883	351	1072	1127	231	139	118	194	0	84
V/C Ratio(X)	0.04	0.57	0.23	0.48	0.57	0.57	0.19	0.00	0.46	0.06	0.00	0.06
Avail Cap(c_a), veh/h	378	1981	883	351	1072	1127	352	214	181	276	0	113
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.5	10.0	7.9	8.2	8.4	8.4	30.0	0.0	31.0	30.8	0.0	31.5
Incr Delay (d2), s/veh	0.0	1.2	0.6	0.4	2.2	2.1	0.1	0.0	1.0	0.0	0.0	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	0.1	5.0	1.5	0.9	5.2	5.4	0.7	0.0	0.9	0.2	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.5	11.2	8.5	8.6	10.6	10.5	30.1	0.0	32.1	30.9	0.0	31.6
LnGrp LOS	A	B	A	A	B	B	C	A	C	C	A	C
Approach Vol, veh/h		1336			1428			97			16	
Approach Delay, s/veh		10.8			10.3			31.2			31.1	
Approach LOS		B			B			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.0	45.0	7.3	8.7	5.8	48.2	5.8	10.2				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	4.0	33.0	7.0	5.0	4.0	33.0	4.0	8.0				
Max Q Clear Time (g_c+I1), s	4.8	16.3	3.6	2.2	2.2	16.7	2.4	4.3				
Green Ext Time (p_c), s	0.0	13.5	0.0	0.0	0.0	13.3	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			11.4									
HCM 6th LOS			B									
Notes												
User approved pedestrian interval to be less than phase max green.												

Timings

1: Joliet Ave & 104th Ave

2040 Total PM.syn

09/08/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	65	1225	55	50	1175	130	145	5	0
Future Volume (vph)	65	1225	55	50	1175	130	145	5	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	Perm	pm+pt	NA
Protected Phases	5	2		1	6	3		7	4
Permitted Phases	2		2	6		8	8	4	
Detector Phase	5	2	2	1	6	3	8	7	4
Switch Phase									
Minimum Initial (s)	4.0	14.0	14.0	4.0	14.0	4.0	5.0	4.0	5.0
Minimum Split (s)	9.0	20.0	20.0	9.0	20.0	9.0	37.0	9.0	10.0
Total Split (s)	9.0	35.0	35.0	9.0	35.0	16.0	15.0	11.0	10.0
Total Split (%)	12.9%	50.0%	50.0%	12.9%	50.0%	22.9%	21.4%	15.7%	14.3%
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None
Act Effect Green (s)	44.2	40.4	40.4	43.1	38.4	12.9	10.8	6.8	5.0
Actuated g/C Ratio	0.63	0.58	0.58	0.62	0.55	0.18	0.15	0.10	0.07
v/c Ratio	0.30	0.65	0.06	0.23	0.66	0.52	0.33	0.03	0.07
Control Delay	9.4	15.8	0.1	8.4	16.4	30.1	1.8	20.0	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	15.8	0.1	8.4	16.4	30.1	1.8	20.0	0.5
LOS	A	B	A	A	B	C	A	B	A
Approach Delay		14.8			16.0				4.1
Approach LOS		B			B				A

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 8 (11%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 15.3

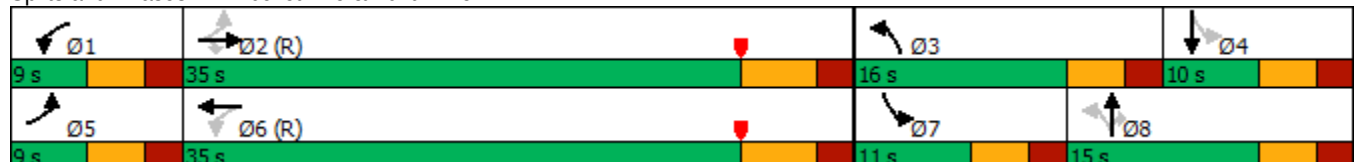
Intersection LOS: B

Intersection Capacity Utilization 64.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Joliet Ave & 104th Ave



HCM 6th Signalized Intersection Summary

2040 Total PM.syn

1: Joliet Ave & 104th Ave

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	1225	55	50	1175	5	130	0	145	5	0	20
Future Volume (veh/h)	65	1225	55	50	1175	5	130	0	145	5	0	20
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	71	1332	60	54	1277	5	141	0	158	5	0	22
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	274	1779	792	247	1797	7	346	293	249	198	0	110
Arrive On Green	0.04	0.50	0.50	0.04	0.50	0.50	0.09	0.00	0.16	0.01	0.00	0.07
Sat Flow, veh/h	1781	3554	1582	1781	3630	14	1781	1870	1585	1781	0	1585
Grp Volume(v), veh/h	71	1332	60	54	625	657	141	0	158	5	0	22
Grp Sat Flow(s),veh/h/ln	1781	1777	1582	1781	1777	1868	1781	1870	1585	1781	0	1585
Q Serve(g_s), s	1.3	21.0	1.4	1.0	19.2	19.2	4.9	0.0	6.5	0.2	0.0	0.9
Cycle Q Clear(g_c), s	1.3	21.0	1.4	1.0	19.2	19.2	4.9	0.0	6.5	0.2	0.0	0.9
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	274	1779	792	247	880	925	346	293	249	198	0	110
V/C Ratio(X)	0.26	0.75	0.08	0.22	0.71	0.71	0.41	0.00	0.64	0.03	0.00	0.20
Avail Cap(c_a), veh/h	300	1779	792	283	880	925	461	293	249	341	0	113
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.9	14.0	9.1	11.4	13.8	13.8	25.0	0.0	27.6	30.0	0.0	30.7
Incr Delay (d2), s/veh	0.2	2.9	0.2	0.2	4.8	4.6	0.3	0.0	4.1	0.0	0.0	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	0.5	8.0	0.5	0.4	7.9	8.2	2.0	0.0	2.6	0.1	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.1	16.9	9.3	11.6	18.6	18.4	25.2	0.0	31.7	30.1	0.0	31.1
LnGrp LOS	B	B	A	B	B	B	C	A	C	C	A	C
Approach Vol, veh/h	1463		1336			299		27				
Approach Delay, s/veh	16.3		18.2			28.7		30.9				
Approach LOS	B		B			C		C				
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.6	41.0	11.5	9.9	8.0	40.7	5.4	16.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	4.0	29.0	11.0	5.0	4.0	29.0	6.0	10.0				
Max Q Clear Time (g_c+I1), s	3.0	23.0	6.9	2.9	3.3	21.2	2.2	8.5				
Green Ext Time (p_c), s	0.0	5.5	0.1	0.0	0.0	6.9	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			18.4									
HCM 6th LOS			B									
Notes												

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	470	525	30	30	60
Future Vol, veh/h	15	470	525	30	30	60
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	93	83	88	78	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	505	633	34	38	87
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	668	0	-	0	946	335
Stage 1	-	-	-	-	651	-
Stage 2	-	-	-	-	295	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1207	-	-	-	440	*867
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	730	-
Platoon blocked, %	1	-	-	-	1	1
Mov Cap-1 Maneuver	1205	-	-	-	432	*866
Mov Cap-2 Maneuver	-	-	-	-	534	-
Stage 1	-	-	-	-	746	-
Stage 2	-	-	-	-	729	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.3	0		10.4		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1205	-	-	-	534	866
HCM Lane V/C Ratio	0.018	-	-	-	0.072	0.1
HCM Control Delay (s)	8	-	-	-	12.3	9.6
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0.3
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	645	490	15	30	35
Future Vol, veh/h	20	645	490	15	30	35
Conflicting Peds, #/hr	1	0	0	1	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	85	90	65	73	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	759	544	23	41	49
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	568	0	-	0	991	286
Stage 1	-	-	-	-	557	-
Stage 2	-	-	-	-	434	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1282	-	-	-	376	*893
Stage 1	-	-	-	-	808	-
Stage 2	-	-	-	-	621	-
Platoon blocked, %	1	-	-	-	1	1
Mov Cap-1 Maneuver	1280	-	-	-	367	*891
Mov Cap-2 Maneuver	-	-	-	-	479	-
Stage 1	-	-	-	-	790	-
Stage 2	-	-	-	-	620	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.3	0		11.1		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1280	-	-	-	479	891
HCM Lane V/C Ratio	0.021	-	-	-	0.086	0.055
HCM Control Delay (s)	7.9	-	-	-	13.2	9.3
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.2
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	485	540	30	30	65
Future Vol, veh/h	15	485	540	30	30	65
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	93	83	88	78	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	522	651	34	38	94
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	686	0	-	0	972	344
Stage 1	-	-	-	-	669	-
Stage 2	-	-	-	-	303	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1183	-	-	-	420	*867
Stage 1	-	-	-	-	741	-
Stage 2	-	-	-	-	723	-
Platoon blocked, %	1	-	-	-	1	1
Mov Cap-1 Maneuver	1182	-	-	-	412	*866
Mov Cap-2 Maneuver	-	-	-	-	518	-
Stage 1	-	-	-	-	726	-
Stage 2	-	-	-	-	722	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.3	0		10.5		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1182	-	-	-	518	866
HCM Lane V/C Ratio	0.018	-	-	-	0.074	0.109
HCM Control Delay (s)	8.1	-	-	-	12.5	9.7
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0.4
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	665	505	15	35	40
Future Vol, veh/h	20	665	505	15	35	40
Conflicting Peds, #/hr	1	0	0	1	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	85	90	65	73	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	782	561	23	48	56
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	585	0	-	0	1019	294
Stage 1	-	-	-	-	574	-
Stage 2	-	-	-	-	445	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1259	-	-	-	358	*893
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	613	-
Platoon blocked, %	1	-	-	-	1	1
Mov Cap-1 Maneuver	1258	-	-	-	350	*891
Mov Cap-2 Maneuver	-	-	-	-	467	-
Stage 1	-	-	-	-	772	-
Stage 2	-	-	-	-	612	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.3	0		11.3		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1258	-	-	-	467	891
HCM Lane V/C Ratio	0.021	-	-	-	0.103	0.063
HCM Control Delay (s)	7.9	-	-	-	13.6	9.3
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.2
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	485	540	65	40	75
Future Vol, veh/h	50	485	540	65	40	75
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	70	93	83	88	78	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	522	651	74	51	109
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	726	0	-	0	1092	364
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	403	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1134	-	-	-	338	*867
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	644	-
Platoon blocked, %	1	-	-	-	1	1
Mov Cap-1 Maneuver	1133	-	-	-	316	*866
Mov Cap-2 Maneuver	-	-	-	-	444	-
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	643	-
Approach	EB	WB		SB		
HCM Control Delay, s	1	0		11.2		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1133	-	-	-	444	866
HCM Lane V/C Ratio	0.063	-	-	-	0.116	0.126
HCM Control Delay (s)	8.4	-	-	-	14.2	9.8
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4	0.4
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	1.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	665	505	25	70	75
Future Vol, veh/h	30	665	505	25	70	75
Conflicting Peds, #/hr	1	0	0	1	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	85	90	65	73	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	782	561	38	96	106
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	600	0	-	0	1052	302
Stage 1	-	-	-	-	581	-
Stage 2	-	-	-	-	471	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1239	-	-	-	337	*893
Stage 1	-	-	-	-	782	-
Stage 2	-	-	-	-	594	-
Platoon blocked, %	1	-	-	-	1	1
Mov Cap-1 Maneuver	1238	-	-	-	326	*891
Mov Cap-2 Maneuver	-	-	-	-	448	-
Stage 1	-	-	-	-	756	-
Stage 2	-	-	-	-	593	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.4	0		12.3		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1238	-	-	-	448	891
HCM Lane V/C Ratio	0.032	-	-	-	0.214	0.119
HCM Control Delay (s)	8	-	-	-	15.2	9.6
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8	0.4
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	625	700	40	35	80
Future Vol, veh/h	20	625	700	40	35	80
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	93	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	672	761	43	38	87
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	805	0	-	0	1164	403
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	380	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1173	-	-	-	*363	*798
Stage 1	-	-	-	-	*753	-
Stage 2	-	-	-	-	*661	-
Platoon blocked, %	1	-	-	-	1	1
Mov Cap-1 Maneuver	1172	-	-	-	*356	*798
Mov Cap-2 Maneuver	-	-	-	-	*479	-
Stage 1	-	-	-	-	*738	-
Stage 2	-	-	-	-	*660	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.3	0		11		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1172	-	-	-	479	798
HCM Lane V/C Ratio	0.019	-	-	-	0.079	0.109
HCM Control Delay (s)	8.1	-	-	-	13.2	10.1
HCM Lane LOS	A	-	-	-	B	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.4
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	855	655	20	40	50
Future Vol, veh/h	25	855	655	20	40	50
Conflicting Peds, #/hr	1	0	0	1	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	929	712	22	43	54
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	735	0	-	0	1243	369
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	519	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	*1219	-	-	-	*296	*815
Stage 1	-	-	-	-	*769	-
Stage 2	-	-	-	-	*562	-
Platoon blocked, %	1	-	-	-	1	1
Mov Cap-1 Maneuver	*1218	-	-	-	*289	*813
Mov Cap-2 Maneuver	-	-	-	-	*420	-
Stage 1	-	-	-	-	*751	-
Stage 2	-	-	-	-	*561	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.2	0		11.9		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	* 1218	-	-	-	420	813
HCM Lane V/C Ratio	0.022	-	-	-	0.104	0.067
HCM Control Delay (s)	8	-	-	-	14.6	9.7
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.2
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	625	700	75	45	90
Future Vol, veh/h	55	625	700	75	45	90
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	93	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	672	761	82	49	98
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	844	0	-	0	1259	423
Stage 1	-	-	-	-	803	-
Stage 2	-	-	-	-	456	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	1122	-	-	-	302	*798
Stage 1	-	-	-	-	737	-
Stage 2	-	-	-	-	605	-
Platoon blocked, %	1	-	-	-	1	1
Mov Cap-1 Maneuver	1121	-	-	-	285	*798
Mov Cap-2 Maneuver	-	-	-	-	424	-
Stage 1	-	-	-	-	697	-
Stage 2	-	-	-	-	604	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.7	0		11.6		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1121	-	-	-	424	798
HCM Lane V/C Ratio	0.053	-	-	-	0.115	0.123
HCM Control Delay (s)	8.4	-	-	-	14.6	10.1
HCM Lane LOS	A	-	-	-	B	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4	0.4
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection

Int Delay, s/veh 1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	35	855	655	30	75	85
Future Vol, veh/h	35	855	655	30	75	85
Conflicting Peds, #/hr	1	0	0	1	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	-	-	-	100	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	929	712	33	82	92

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	746	0	0 1271 375
Stage 1	-	-	- 730 -
Stage 2	-	-	- 541 -
Critical Hdwy	4.14	-	- 6.84 6.94
Critical Hdwy Stg 1	-	-	- 5.84 -
Critical Hdwy Stg 2	-	-	- 5.84 -
Follow-up Hdwy	2.22	-	- 3.52 3.32
Pot Cap-1 Maneuver	1215	-	- *280 *815
Stage 1	-	-	- *769 -
Stage 2	-	-	- *548 -
Platoon blocked, %	1	-	- 1 1
Mov Cap-1 Maneuver	1214	-	- *271 *813
Mov Cap-2 Maneuver	-	-	- *406 -
Stage 1	-	-	- *744 -
Stage 2	-	-	- *547 -

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	12.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1214	-	-	-	406	813
HCM Lane V/C Ratio	0.031	-	-	-	0.201	0.114
HCM Control Delay (s)	8.1	-	-	-	16.1	10
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7	0.4

Notes

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

Timings
3: SH-2 & 96th Ave

2020 Existing AM.syn

08/25/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	340	160	340	405	55	65	325	125	15	1185	70
Future Volume (vph)	30	340	160	340	405	55	65	325	125	15	1185	70
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	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	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0
Total Split (s)	11.0	24.0	24.0	27.0	40.0	40.0	11.0	58.0	58.0	11.0	58.0	58.0
Total Split (%)	9.2%	20.0%	20.0%	22.5%	33.3%	33.3%	9.2%	48.3%	48.3%	9.2%	48.3%	48.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effect Green (s)	22.3	17.3	17.3	44.3	35.5	35.5	60.1	57.1	57.1	58.9	54.9	54.9
Actuated g/C Ratio	0.19	0.14	0.14	0.37	0.30	0.30	0.50	0.48	0.48	0.49	0.46	0.46
v/c Ratio	0.22	0.80	0.53	0.93	0.50	0.14	0.50	0.20	0.23	0.04	0.86	0.09
Control Delay	29.2	62.0	13.7	61.8	37.5	0.6	27.6	19.7	3.5	14.1	36.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.2	62.0	13.7	61.8	37.5	0.6	27.6	19.7	3.5	14.1	36.7	0.2
LOS	C	E	B	E	D	A	C	B	A	B	D	A
Approach Delay		44.5			43.7			15.5			34.5	
Approach LOS		D			D			B			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 35.6

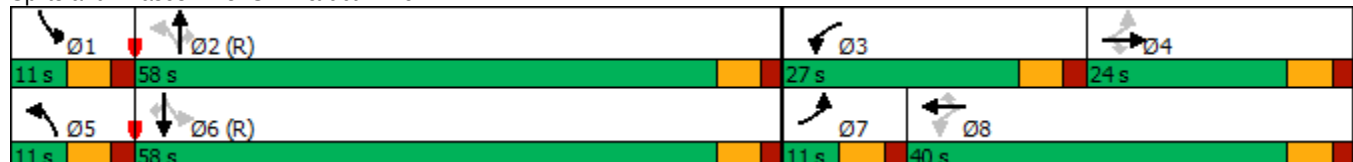
Intersection LOS: D

Intersection Capacity Utilization 85.2%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 3: SH-2 & 96th Ave



HCM 6th Signalized Intersection Summary

3: SH-2 & 96th Ave

2020 Existing AM.syn
08/25/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	340	160	340	405	55	65	325	125	15	1185	70
Future Volume (veh/h)	30	340	160	340	405	55	65	325	125	15	1185	70
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	44	405	0	362	526	0	70	335	189	23	1394	78
Peak Hour Factor	0.68	0.84	0.77	0.94	0.77	0.72	0.93	0.97	0.66	0.65	0.85	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	477		394	985		163	1665	741	462	1611	717
Arrive On Green	0.03	0.13	0.00	0.17	0.28	0.00	0.04	0.47	0.47	0.02	0.45	0.45
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1581	1781	3554	1581
Grp Volume(v), veh/h	44	405	0	362	526	0	70	335	189	23	1394	78
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1581	1781	1777	1581
Q Serve(g_s), s	2.5	13.4	0.0	20.6	15.1	0.0	2.5	6.6	8.7	0.8	42.3	3.4
Cycle Q Clear(g_c), s	2.5	13.4	0.0	20.6	15.1	0.0	2.5	6.6	8.7	0.8	42.3	3.4
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	235	477		394	985		163	1665	741	462	1611	717
V/C Ratio(X)	0.19	0.85		0.92	0.53		0.43	0.20	0.26	0.05	0.87	0.11
Avail Cap(c_a), veh/h	252	533		394	1007		170	1665	741	497	1611	717
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.8	50.8	0.0	35.5	36.8	0.0	25.5	18.7	19.2	16.8	29.5	18.9
Incr Delay (d2), s/veh	0.4	11.4	0.0	26.3	0.5	0.0	1.8	0.3	0.8	0.0	6.5	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	1.1	6.7	0.0	11.8	6.6	0.0	1.1	2.8	3.4	0.3	19.1	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.2	62.2	0.0	61.8	37.3	0.0	27.2	19.0	20.1	16.9	36.0	19.2
LnGrp LOS	D	E		E	D		C	B	C	B	D	B
Approach Vol, veh/h		449	A		888	A		594			1495	
Approach Delay, s/veh		60.3			47.3			20.3			34.8	
Approach LOS		E			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.7	62.2	27.0	22.1	10.5	60.4	9.8	39.2				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	5.0	52.0	21.0	18.0	5.0	52.0	5.0	34.0				
Max Q Clear Time (g_c+l1), s	2.8	10.7	22.6	15.4	4.5	44.3	4.5	17.1				
Green Ext Time (p_c), s	0.0	3.1	0.0	0.7	0.0	5.4	0.0	3.3				

Intersection Summary

HCM 6th Ctrl Delay 38.9
HCM 6th LOS D

Notes

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

Timings
3: SH-2 & 96th Ave

2020 Existing PM.syn

08/25/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	470	100	160	355	40	115	1085	360	70	420	35
Future Volume (vph)	95	470	100	160	355	40	115	1085	360	70	420	35
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	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	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0
Total Split (s)	13.0	34.0	34.0	15.0	36.0	36.0	12.0	58.0	58.0	13.0	59.0	59.0
Total Split (%)	10.8%	28.3%	28.3%	12.5%	30.0%	30.0%	10.0%	48.3%	48.3%	10.8%	49.2%	49.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effect Green (s)	31.6	24.6	24.6	35.6	26.6	26.6	62.5	55.2	55.2	62.3	55.2	55.2
Actuated g/C Ratio	0.26	0.20	0.20	0.30	0.22	0.22	0.52	0.46	0.46	0.52	0.46	0.46
v/c Ratio	0.46	0.77	0.31	0.83	0.47	0.11	0.33	0.73	0.50	0.46	0.34	0.07
Control Delay	35.3	52.6	8.1	61.8	42.1	0.5	15.7	30.4	10.7	20.4	21.9	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.3	52.6	8.1	61.8	42.1	0.5	15.7	30.4	10.7	20.4	21.9	0.2
LOS	D	D	A	E	D	A	B	C	B	C	C	A
Approach Delay		42.6			44.5			24.3			19.8	
Approach LOS		D			D			C			B	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 30.5

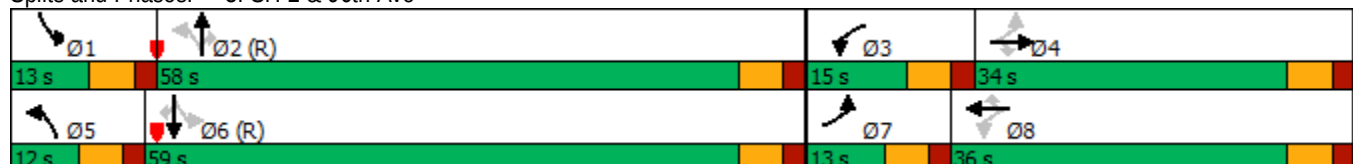
Intersection LOS: C

Intersection Capacity Utilization 76.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: SH-2 & 96th Ave



HCM 6th Signalized Intersection Summary

3: SH-2 & 96th Ave

2020 Existing PM.syn
08/25/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	470	100	160	355	40	115	1085	360	70	420	35
Future Volume (veh/h)	95	470	100	160	355	40	115	1085	360	70	420	35
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	130	560	0	178	366	0	147	1192	434	93	545	60
Peak Hour Factor	0.73	0.84	0.74	0.90	0.97	0.80	0.78	0.91	0.83	0.75	0.77	0.58
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	278	666		224	725		471	1765	787	208	1733	772
Arrive On Green	0.06	0.19	0.00	0.08	0.20	0.00	0.05	0.50	0.50	0.04	0.49	0.49
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1584	1781	3554	1584
Grp Volume(v), veh/h	130	560	0	178	366	0	147	1192	434	93	545	60
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1584	1781	1777	1584
Q Serve(g_s), s	7.0	18.2	0.0	9.0	11.0	0.0	5.0	30.5	22.8	3.1	11.1	2.4
Cycle Q Clear(g_c), s	7.0	18.2	0.0	9.0	11.0	0.0	5.0	30.5	22.8	3.1	11.1	2.4
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	278	666		224	725		471	1765	787	208	1733	772
V/C Ratio(X)	0.47	0.84		0.80	0.50		0.31	0.68	0.55	0.45	0.31	0.08
Avail Cap(c_a), veh/h	278	829		224	888		471	1765	787	239	1733	772
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.3	47.0	0.0	39.4	42.4	0.0	14.6	22.9	20.9	19.2	18.6	16.4
Incr Delay (d2), s/veh	1.2	6.4	0.0	17.8	0.5	0.0	0.4	2.1	2.8	1.5	0.5	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	3.2	8.6	0.0	5.4	4.9	0.0	2.0	13.0	8.9	1.3	4.7	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.6	53.4	0.0	57.2	42.9	0.0	15.0	25.0	23.7	20.7	19.1	16.6
LnGrp LOS	D	D		E	D		B	C	C	C	B	B
Approach Vol, veh/h		690	A		544	A		1773			698	
Approach Delay, s/veh		50.6			47.6			23.8			19.1	
Approach LOS		D			D			C			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.9	65.6	15.0	28.5	12.0	64.5	13.0	30.5				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	7.0	52.0	9.0	28.0	6.0	53.0	7.0	30.0				
Max Q Clear Time (g_c+l1), s	5.1	32.5	11.0	20.2	7.0	13.1	9.0	13.0				
Green Ext Time (p_c), s	0.0	10.6	0.0	2.3	0.0	4.4	0.0	2.2				
Intersection Summary												
HCM 6th Ctrl Delay			31.4									
HCM 6th LOS			C									
Notes												
Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.												

Timings
3: SH-2 & 96th Ave

2022 Background AM.syn

04/23/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	350	165	350	415	55	70	335	125	15	1220	75
Future Volume (vph)	30	350	165	350	415	55	70	335	125	15	1220	75
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	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	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0
Total Split (s)	14.0	28.0	28.0	27.0	41.0	41.0	11.0	54.0	54.0	11.0	54.0	54.0
Total Split (%)	11.7%	23.3%	23.3%	22.5%	34.2%	34.2%	9.2%	45.0%	45.0%	9.2%	45.0%	45.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effect Green (s)	26.5	19.4	19.4	46.3	35.5	35.5	58.3	54.9	54.9	56.5	52.2	52.2
Actuated g/C Ratio	0.22	0.16	0.16	0.39	0.30	0.30	0.49	0.46	0.46	0.47	0.44	0.44
v/c Ratio	0.18	0.73	0.51	0.92	0.51	0.14	0.50	0.21	0.23	0.05	0.93	0.10
Control Delay	25.7	55.5	13.1	58.9	37.5	0.6	28.5	21.5	3.9	15.9	45.6	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	55.5	13.1	58.9	37.5	0.6	28.5	21.5	3.9	15.9	45.6	0.3
LOS	C	E	B	E	D	A	C	C	A	B	D	A
Approach Delay		40.1			42.7			16.9			42.7	
Approach LOS		D			D			B			D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 38.1

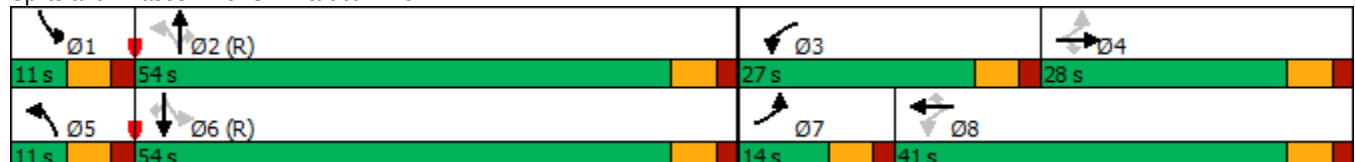
Intersection LOS: D

Intersection Capacity Utilization 87.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 3: SH-2 & 96th Ave



HCM 6th Signalized Intersection Summary

3: SH-2 & 96th Ave

2022 Background AM.syn

04/23/2020

																			
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR							
Lane Configurations																			
Traffic Volume (veh/h)	30	350	165	350	415	55	70	335	125	15	1220	75							
Future Volume (veh/h)	30	350	165	350	415	55	70	335	125	15	1220	75							
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	44	417	0	372	539	0	75	345	189	23	1435	83							
Peak Hour Factor	0.68	0.84	0.77	0.94	0.77	0.72	0.93	0.97	0.66	0.65	0.85	0.90							
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2							
Cap, veh/h	240	507		399	1015		151	1635	727	449	1578	702							
Arrive On Green	0.03	0.14	0.00	0.17	0.29	0.00	0.04	0.46	0.46	0.02	0.44	0.44							
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1581	1781	3554	1581							
Grp Volume(v), veh/h	44	417	0	372	539	0	75	345	189	23	1435	83							
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1581	1781	1777	1581							
Q Serve(g_s), s	2.5	13.7	0.0	21.0	15.3	0.0	2.7	7.0	8.8	0.8	45.2	3.7							
Cycle Q Clear(g_c), s	2.5	13.7	0.0	21.0	15.3	0.0	2.7	7.0	8.8	0.8	45.2	3.7							
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	240	507		399	1015		151	1635	727	449	1578	702							
V/C Ratio(X)	0.18	0.82		0.93	0.53		0.50	0.21	0.26	0.05	0.91	0.12							
Avail Cap(c_a), veh/h	302	652		399	1036		158	1635	727	484	1578	702							
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00							
Uniform Delay (d), s/veh	41.9	50.0	0.0	35.1	36.1	0.0	27.4	19.4	19.9	17.4	31.1	19.6							
Incr Delay (d2), s/veh	0.4	6.6	0.0	28.4	0.5	0.0	2.5	0.3	0.9	0.0	9.3	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	1.1	6.5	0.0	12.2	6.7	0.0	1.2	3.0	3.4	0.4	20.9	1.4							
Unsig. Movement Delay, s/veh																			
LnGrp Delay(d),s/veh	42.3	56.6	0.0	63.5	36.6	0.0	29.8	19.7	20.7	17.5	40.4	19.9							
LnGrp LOS	D	E		E	D		C	B	C	B	D	B							
Approach Vol, veh/h	461			A			911			A									
Approach Delay, s/veh	55.3						47.6			21.2									
Approach LOS	E						D			C									
Timer - Assigned Phs	1	2	3	4	5	6	7	8											
Phs Duration (G+Y+Rc), s	8.7	61.2	27.0	23.1	10.6	59.3	9.8	40.3											
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0											
Max Green Setting (Gmax), s	5.0	48.0	21.0	22.0	5.0	48.0	8.0	35.0											
Max Q Clear Time (g_c+l1), s	2.8	10.8	23.0	15.7	4.7	47.2	4.5	17.3											
Green Ext Time (p_c), s	0.0	3.1	0.0	1.4	0.0	0.7	0.0	3.4											
Intersection Summary																			
HCM 6th Ctrl Delay	40.2																		
HCM 6th LOS	D																		
Notes																			

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

Timings
3: SH-2 & 96th Ave

2022 Background PM.syn

04/23/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	480	100	165	365	40	115	1115	370	75	435	35
Future Volume (vph)	95	480	100	165	365	40	115	1115	370	75	435	35
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	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	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0
Total Split (s)	16.0	36.0	36.0	15.0	35.0	35.0	12.0	56.0	56.0	13.0	57.0	57.0
Total Split (%)	13.3%	30.0%	30.0%	12.5%	29.2%	29.2%	10.0%	46.7%	46.7%	10.8%	47.5%	47.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effect Green (s)	35.1	25.5	25.5	33.9	24.9	24.9	61.7	54.0	54.0	61.3	53.8	53.8
Actuated g/C Ratio	0.29	0.21	0.21	0.28	0.21	0.21	0.51	0.45	0.45	0.51	0.45	0.45
v/c Ratio	0.44	0.76	0.30	0.84	0.51	0.12	0.34	0.77	0.52	0.52	0.36	0.08
Control Delay	32.4	51.1	7.7	62.5	44.3	0.6	16.5	32.6	10.2	23.8	23.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.4	51.1	7.7	62.5	44.3	0.6	16.5	32.6	10.2	23.8	23.1	0.2
LOS	C	D	A	E	D	A	B	C	B	C	C	A
Approach Delay		41.2			46.2			25.8			21.3	
Approach LOS		D			D			C			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 31.3

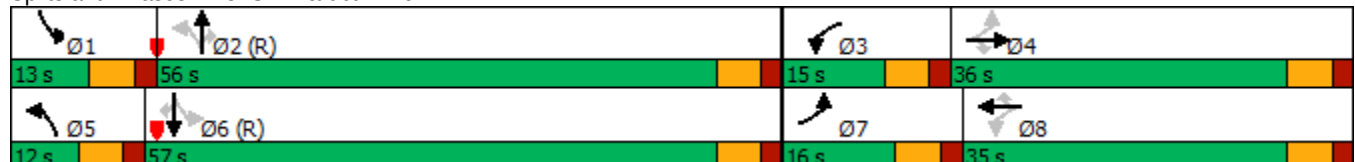
Intersection LOS: C

Intersection Capacity Utilization 77.4%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: SH-2 & 96th Ave



HCM 6th Signalized Intersection Summary

3: SH-2 & 96th Ave

2022 Background PM.syn

04/23/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	480	100	165	365	40	115	1115	370	75	435	35
Future Volume (veh/h)	95	480	100	165	365	40	115	1115	370	75	435	35
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	130	571	0	183	376	0	147	1225	446	100	565	60
Peak Hour Factor	0.73	0.84	0.74	0.90	0.97	0.80	0.78	0.91	0.83	0.75	0.77	0.58
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	291	686		226	691		456	1736	774	203	1713	763
Arrive On Green	0.07	0.19	0.00	0.08	0.19	0.00	0.05	0.49	0.49	0.04	0.48	0.48
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1584	1781	3554	1584
Grp Volume(v), veh/h	130	571	0	183	376	0	147	1225	446	100	565	60
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1584	1781	1777	1584
Q Serve(g_s), s	6.9	18.5	0.0	9.0	11.4	0.0	5.1	32.3	24.1	3.4	11.8	2.4
Cycle Q Clear(g_c), s	6.9	18.5	0.0	9.0	11.4	0.0	5.1	32.3	24.1	3.4	11.8	2.4
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	291	686		226	691		456	1736	774	203	1713	763
V/C Ratio(X)	0.45	0.83		0.81	0.54		0.32	0.71	0.58	0.49	0.33	0.08
Avail Cap(c_a), veh/h	308	888		226	859		456	1736	774	229	1713	763
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.4	46.6	0.0	39.4	43.6	0.0	15.0	24.0	21.9	20.6	19.1	16.7
Incr Delay (d2), s/veh	1.1	5.3	0.0	19.4	0.7	0.0	0.4	2.4	3.1	1.9	0.5	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	3.1	8.7	0.0	5.6	5.1	0.0	2.1	13.8	9.5	1.5	4.9	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.5	51.9	0.0	58.8	44.2	0.0	15.4	26.4	25.0	22.4	19.7	16.9
LnGrp LOS	D	D		E	D		B	C	C	C	B	B
Approach Vol, veh/h	701		A	559		A	1818		725			
Approach Delay, s/veh	49.0			49.0			25.2		19.8			
Approach LOS	D			D			C		B			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.2	64.6	15.0	29.2	12.0	63.8	14.8	29.3				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	7.0	50.0	9.0	30.0	6.0	51.0	10.0	29.0				
Max Q Clear Time (g_c+l1), s	5.4	34.3	11.0	20.5	7.1	13.8	8.9	13.4				
Green Ext Time (p_c), s	0.0	9.5	0.0	2.6	0.0	4.5	0.0	2.1				
Intersection Summary												
HCM 6th Ctrl Delay			32.0									
HCM 6th LOS			C									
Notes												

Timings
3: SH-2 & 96th Ave

2022 Total AM.syn

09/08/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	355	175	350	425	55	95	335	125	15	1220	75
Future Volume (vph)	30	355	175	350	425	55	95	335	125	15	1220	75
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	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	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0
Total Split (s)	17.0	30.0	30.0	27.0	40.0	40.0	11.0	52.0	52.0	11.0	52.0	52.0
Total Split (%)	14.2%	25.0%	25.0%	22.5%	33.3%	33.3%	9.2%	43.3%	43.3%	9.2%	43.3%	43.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effect Green (s)	27.6	20.3	20.3	47.1	36.1	36.1	57.6	53.9	53.9	53.7	48.0	48.0
Actuated g/C Ratio	0.23	0.17	0.17	0.39	0.30	0.30	0.48	0.45	0.45	0.45	0.40	0.40
v/c Ratio	0.18	0.71	0.53	0.91	0.52	0.13	0.62	0.22	0.24	0.05	1.01	0.11
Control Delay	24.6	53.5	14.3	56.1	37.1	0.6	37.0	22.4	4.1	16.7	63.6	0.3
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	24.6	53.5	14.3	56.1	37.1	0.6	37.0	22.4	4.1	16.7	63.6	0.3
LOS	C	D	B	E	D	A	D	C	A	B	E	A
Approach Delay		38.8			41.4			19.3			59.5	
Approach LOS		D			D			B			E	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 44.5

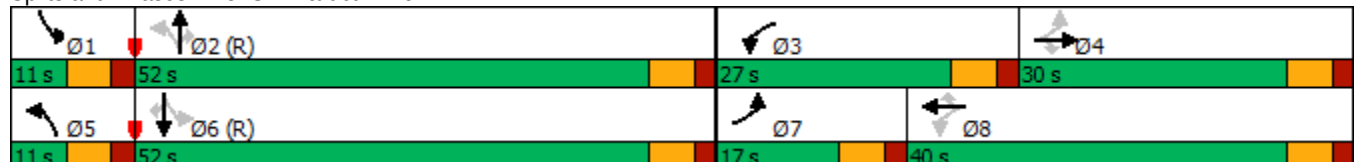
Intersection LOS: D

Intersection Capacity Utilization 88.2%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 3: SH-2 & 96th Ave



HCM 6th Signalized Intersection Summary

3: SH-2 & 96th Ave

2022 Total AM.syn

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	355	175	350	425	55	95	335	125	15	1220	75
Future Volume (veh/h)	30	355	175	350	425	55	95	335	125	15	1220	75
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	44	423	0	372	552	0	102	345	189	23	1435	83
Peak Hour Factor	0.68	0.84	0.77	0.94	0.77	0.72	0.93	0.97	0.66	0.65	0.85	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	242	520		402	1028		153	1622	721	446	1553	691
Arrive On Green	0.03	0.15	0.00	0.17	0.29	0.00	0.04	0.46	0.46	0.02	0.44	0.44
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1581	1781	3554	1581
Grp Volume(v), veh/h	44	423	0	372	552	0	102	345	189	23	1435	83
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1581	1781	1777	1581
Q Serve(g_s), s	2.5	13.8	0.0	21.0	15.7	0.0	3.8	7.0	8.9	0.8	45.8	3.7
Cycle Q Clear(g_c), s	2.5	13.8	0.0	21.0	15.7	0.0	3.8	7.0	8.9	0.8	45.8	3.7
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	242	520		402	1028		153	1622	721	446	1553	691
V/C Ratio(X)	0.18	0.81		0.93	0.54		0.67	0.21	0.26	0.05	0.92	0.12
Avail Cap(c_a), veh/h	348	711		402	1028		153	1622	721	480	1553	691
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.5	49.6	0.0	34.7	35.9	0.0	28.1	19.6	20.1	17.9	31.9	20.1
Incr Delay (d2), s/veh	0.4	5.2	0.0	27.3	0.6	0.0	10.4	0.3	0.9	0.0	10.7	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	1.1	6.5	0.0	12.0	6.9	0.0	2.0	3.0	3.4	0.4	21.4	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.9	54.8	0.0	62.0	36.4	0.0	38.5	19.9	21.0	17.9	42.6	20.4
LnGrp LOS	D	D		E	D		D	B	C	B	D	C
Approach Vol, veh/h			A			A			636			
Approach Delay, s/veh			53.6			46.7			23.2			
Approach LOS			D			D			C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.7	60.8	27.0	23.6	11.0	58.4	9.8	40.7				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	5.0	46.0	21.0	24.0	5.0	46.0	11.0	34.0				
Max Q Clear Time (g_c+l1), s	2.8	10.9	23.0	15.8	5.8	47.8	4.5	17.7				
Green Ext Time (p_c), s	0.0	3.1	0.0	1.7	0.0	0.0	0.0	3.4				
Intersection Summary												
HCM 6th Ctrl Delay			41.0									
HCM 6th LOS			D									
Notes												

Timings
3: SH-2 & 96th Ave

2022 Total PM.syn

09/08/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	490	125	165	370	40	125	1115	370	75	435	35
Future Volume (vph)	95	490	125	165	370	40	125	1115	370	75	435	35
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	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	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	24.0
Total Split (s)	16.0	36.0	36.0	15.0	35.0	35.0	15.0	56.0	56.0	13.0	54.0	54.0
Total Split (%)	13.3%	30.0%	30.0%	12.5%	29.2%	29.2%	12.5%	46.7%	46.7%	10.8%	45.0%	45.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effect Green (s)	35.7	26.1	26.1	34.5	25.5	25.5	62.6	53.4	53.4	59.2	51.7	51.7
Actuated g/C Ratio	0.30	0.22	0.22	0.29	0.21	0.21	0.52	0.44	0.44	0.49	0.43	0.43
v/c Ratio	0.43	0.76	0.36	0.84	0.51	0.11	0.37	0.78	0.52	0.53	0.37	0.08
Control Delay	32.0	50.6	7.5	61.9	43.8	0.5	16.4	33.2	10.4	25.9	24.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.0	50.6	7.5	61.9	43.8	0.5	16.4	33.2	10.4	25.9	24.7	0.2
LOS	C	D	A	E	D	A	B	C	B	C	C	A
Approach Delay		39.6			45.7			26.2			22.9	
Approach LOS		D			D			C			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 31.5

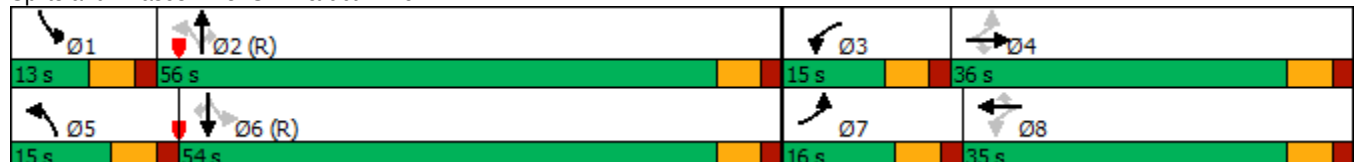
Intersection LOS: C

Intersection Capacity Utilization 77.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: SH-2 & 96th Ave



HCM 6th Signalized Intersection Summary

3: SH-2 & 96th Ave

2022 Total PM.syn

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	490	125	165	370	40	125	1115	370	75	435	35
Future Volume (veh/h)	95	490	125	165	370	40	125	1115	370	75	435	35
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	130	583	0	183	381	0	160	1225	446	100	565	60
Peak Hour Factor	0.73	0.84	0.74	0.90	0.97	0.80	0.78	0.91	0.83	0.75	0.77	0.58
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	292	697		226	703		464	1721	767	202	1654	737
Arrive On Green	0.07	0.20	0.00	0.08	0.20	0.00	0.06	0.48	0.48	0.04	0.47	0.47
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1584	1781	3554	1584
Grp Volume(v), veh/h	130	583	0	183	381	0	160	1225	446	100	565	60
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1584	1781	1777	1584
Q Serve(g_s), s	6.9	18.9	0.0	9.0	11.6	0.0	5.6	32.5	24.2	3.5	12.1	2.5
Cycle Q Clear(g_c), s	6.9	18.9	0.0	9.0	11.6	0.0	5.6	32.5	24.2	3.5	12.1	2.5
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	292	697		226	703		464	1721	767	202	1654	737
V/C Ratio(X)	0.44	0.84		0.81	0.54		0.34	0.71	0.58	0.49	0.34	0.08
Avail Cap(c_a), veh/h	310	888		226	859		485	1721	767	227	1654	737
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.1	46.4	0.0	39.1	43.3	0.0	15.4	24.3	22.2	21.0	20.4	17.8
Incr Delay (d2), s/veh	1.1	5.6	0.0	19.6	0.7	0.0	0.4	2.5	3.2	1.9	0.6	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	3.1	8.9	0.0	5.6	5.2	0.0	2.3	14.0	9.5	1.5	5.1	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.2	52.0	0.0	58.7	43.9	0.0	15.8	26.9	25.4	22.9	20.9	18.0
LnGrp LOS	D	D		E	D		B	C	C	C	C	B
Approach Vol, veh/h	713		A	564		A	1831		725			
Approach Delay, s/veh	49.1			48.7			25.6		21.0			
Approach LOS	D			D			C		C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.3	64.1	15.0	29.5	13.6	61.9	14.8	29.7				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	7.0	50.0	9.0	30.0	9.0	48.0	10.0	29.0				
Max Q Clear Time (g_c+l1), s	5.5	34.5	11.0	20.9	7.6	14.1	8.9	13.6				
Green Ext Time (p_c), s	0.0	9.4	0.0	2.6	0.1	4.5	0.0	2.2				
Intersection Summary												
HCM 6th Ctrl Delay			32.5									
HCM 6th LOS			C									
Notes												

Timings
3: SH-2 & 96th Ave

2040 Background AM.syn

09/08/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	455	215	455	540	75	90	430	165	20	1575	95
Future Volume (vph)	40	455	215	455	540	75	90	430	165	20	1575	95
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4		3	8		5	2	3	1	6	7
Permitted Phases	4		4			8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	3	1	6	7
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)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	11.0	11.0	24.0	11.0
Total Split (s)	11.0	25.0	25.0	26.0	40.0	40.0	11.0	73.0	26.0	11.0	73.0	11.0
Total Split (%)	8.1%	18.5%	18.5%	19.3%	29.6%	29.6%	8.1%	54.1%	19.3%	8.1%	54.1%	8.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	None
Act Effect Green (s)	28.2	21.2	19.2	21.8	36.0	36.0	77.6	73.4	95.2	76.0	69.0	80.0
Actuated g/C Ratio	0.21	0.16	0.14	0.16	0.27	0.27	0.57	0.54	0.71	0.56	0.51	0.59
v/c Ratio	0.21	0.89	0.63	0.87	0.62	0.16	0.66	0.23	0.16	0.04	0.95	0.10
Control Delay	33.5	75.3	24.6	72.4	46.9	2.6	43.6	17.1	1.2	11.7	43.5	1.5
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	33.5	75.3	24.6	72.4	46.9	2.6	43.6	17.1	1.2	11.7	43.5	1.5
LOS	C	E	C	E	D	A	D	B	A	B	D	A
Approach Delay		57.6			54.5			16.7			40.7	
Approach LOS		E			D			B			D	

Intersection Summary

Cycle Length: 135
 Actuated Cycle Length: 135
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 43.3
 Intersection Capacity Utilization 87.4%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service E

Splits and Phases: 3: SH-2 & 96th Ave

											
11 s	73 s		26 s		25 s						
											
11 s	73 s		11 s		40 s						

HCM 6th Signalized Intersection Summary

3: SH-2 & 96th Ave

2040 Background AM.syn

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	455	215	455	540	75	90	430	165	20	1575	95
Future Volume (veh/h)	40	455	215	455	540	75	90	430	165	20	1575	95
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	43	495	0	484	587	0	97	443	179	22	1712	103
Peak Hour Factor	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.97	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	241	553		563	974		160	1874	1092	486	1816	879
Arrive On Green	0.04	0.16	0.00	0.16	0.27	0.00	0.05	0.53	0.53	0.04	0.51	0.51
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1581	1781	3554	1581
Grp Volume(v), veh/h	43	495	0	484	587	0	97	443	179	22	1712	103
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1581	1781	1777	1581
Q Serve(g_s), s	2.7	18.4	0.0	18.4	19.4	0.0	3.4	9.1	5.3	0.8	61.4	4.2
Cycle Q Clear(g_c), s	2.7	18.4	0.0	18.4	19.4	0.0	3.4	9.1	5.3	0.8	61.4	4.2
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	241	553		563	974		160	1874	1092	486	1816	879
V/C Ratio(X)	0.18	0.90		0.86	0.60		0.61	0.24	0.16	0.05	0.94	0.12
Avail Cap(c_a), veh/h	254	553		563	974		160	1874	1092	515	1816	879
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.3	55.9	0.0	55.0	42.6	0.0	30.7	17.2	7.3	14.2	31.1	14.3
Incr Delay (d2), s/veh	0.4	17.1	0.0	12.7	1.1	0.0	6.3	0.3	0.3	0.0	11.3	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	1.2	9.6	0.0	9.0	8.7	0.0	1.9	3.8	1.9	0.3	28.3	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.7	73.0	0.0	67.7	43.7	0.0	37.0	17.5	7.6	14.3	42.4	14.5
LnGrp LOS	D	E		E	D		D	B	A	B	D	B
Approach Vol, veh/h	538		A		1071		A		719		1837	
Approach Delay, s/veh	70.8				54.5				17.7		40.5	
Approach LOS	E		D		B				D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.8	75.2	26.0	25.0	11.0	73.0	10.0	41.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	5.0	67.0	20.0	19.0	5.0	67.0	5.0	34.0				
Max Q Clear Time (g_c+l1), s	2.8	11.1	20.4	20.4	5.4	63.4	4.7	21.4				
Green Ext Time (p_c), s	0.0	4.0	0.0	0.0	0.0	3.2	0.0	3.2				

Intersection Summary

HCM 6th Ctrl Delay 44.1

HCM 6th LOS D

Notes

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

Timings
3: SH-2 & 96th Ave

2040 Background PM.syn

04/23/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	620	130	210	475	50	150	1440	480	95	560	45
Future Volume (vph)	125	620	130	210	475	50	150	1440	480	95	560	45
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4		3	8		5	2	3	1	6	7
Permitted Phases	4		4			8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	3	1	6	7
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)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	11.0	11.0	24.0	11.0
Total Split (s)	13.0	32.0	32.0	15.0	34.0	34.0	15.0	62.0	15.0	11.0	58.0	13.0
Total Split (%)	10.8%	26.7%	26.7%	12.5%	28.3%	28.3%	12.5%	51.7%	12.5%	9.2%	48.3%	10.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	None
Act Effect Green (s)	32.5	25.5	25.5	9.0	27.5	27.5	64.8	56.1	65.1	58.2	52.8	65.8
Actuated g/C Ratio	0.27	0.21	0.21	0.08	0.23	0.23	0.54	0.47	0.54	0.48	0.44	0.55
v/c Ratio	0.58	0.90	0.32	0.89	0.60	0.12	0.39	0.95	0.59	0.73	0.39	0.05
Control Delay	40.8	61.8	8.3	88.5	44.9	0.5	15.8	43.7	15.5	47.3	23.9	1.0
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	40.8	61.8	8.3	88.5	44.9	0.5	15.8	43.7	15.5	47.3	23.9	1.0
LOS	D	E	A	F	D	A	B	D	B	D	C	A
Approach Delay		50.9			54.7			35.1			25.6	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 39.9

Intersection LOS: D

Intersection Capacity Utilization 88.2%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 3: SH-2 & 96th Ave

											
Ø1	Ø2 (R)		Ø3	Ø4		Ø5	Ø6 (R)	Ø7	Ø8		
11 s	62 s		15 s	32 s		15 s	58 s	13 s	34 s		

HCM 6th Signalized Intersection Summary

3: SH-2 & 96th Ave

2040 Background PM.syn

04/23/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	620	130	210	475	50	150	1440	480	95	560	45
Future Volume (veh/h)	125	620	130	210	475	50	150	1440	480	95	560	45
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	136	674	0	228	490	0	163	1565	522	103	609	49
Peak Hour Factor	0.92	0.92	0.92	0.92	0.97	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	256	741		259	801		438	1687	871	146	1602	807
Arrive On Green	0.06	0.21	0.00	0.08	0.23	0.00	0.07	0.47	0.47	0.04	0.45	0.45
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1584	1781	3554	1584
Grp Volume(v), veh/h	136	674	0	228	490	0	163	1565	522	103	609	49
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1584	1781	1777	1584
Q Serve(g_s), s	7.0	22.2	0.0	7.8	14.9	0.0	5.8	49.6	26.6	3.7	13.6	1.9
Cycle Q Clear(g_c), s	7.0	22.2	0.0	7.8	14.9	0.0	5.8	49.6	26.6	3.7	13.6	1.9
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	256	741		259	801		438	1687	871	146	1602	807
V/C Ratio(X)	0.53	0.91		0.88	0.61		0.37	0.93	0.60	0.70	0.38	0.06
Avail Cap(c_a), veh/h	256	770		259	829		455	1687	871	146	1602	807
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.1	46.4	0.0	55.0	41.8	0.0	16.4	29.6	18.1	28.2	21.8	14.9
Incr Delay (d2), s/veh	2.1	14.5	0.0	27.4	1.3	0.0	0.5	10.4	3.0	14.1	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	3.3	11.3	0.0	4.4	6.7	0.0	2.4	22.9	10.2	2.1	5.8	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.2	60.8	0.0	82.3	43.0	0.0	16.9	40.0	21.2	42.3	22.5	15.1
LnGrp LOS	D	E		F	D		B	D	C	D	C	B
Approach Vol, veh/h	810		A	718		A	2250		761			
Approach Delay, s/veh	57.0			55.5			33.9		24.7			
Approach LOS	E			E			C		C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	63.0	15.0	31.0	13.9	60.1	13.0	33.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	5.0	56.0	9.0	26.0	9.0	52.0	7.0	28.0				
Max Q Clear Time (g_c+l1), s	5.7	51.6	9.8	24.2	7.8	15.6	9.0	16.9				
Green Ext Time (p_c), s	0.0	3.8	0.0	0.8	0.0	4.9	0.0	2.4				
Intersection Summary												
HCM 6th Ctrl Delay	39.9											
HCM 6th LOS	D											

Timings
3: SH-2 & 96th Ave

2040 Total AM.syn

09/08/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	460	225	455	550	75	115	430	165	20	1575	95
Future Volume (vph)	40	460	225	455	550	75	115	430	165	20	1575	95
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4		3	8		5	2	3	1	6	7
Permitted Phases	4		4			8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	3	1	6	7
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)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	11.0	11.0	24.0	11.0
Total Split (s)	11.0	26.0	26.0	26.0	41.0	41.0	11.0	72.0	26.0	11.0	72.0	11.0
Total Split (%)	8.1%	19.3%	19.3%	19.3%	30.4%	30.4%	8.1%	53.3%	19.3%	8.1%	53.3%	8.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	None
Act Effect Green (s)	25.0	20.0	20.0	20.0	35.0	35.0	73.4	70.4	90.4	71.0	66.0	77.0
Actuated g/C Ratio	0.19	0.15	0.15	0.15	0.26	0.26	0.54	0.52	0.67	0.53	0.49	0.57
v/c Ratio	0.24	0.95	0.65	0.95	0.65	0.17	1.02	0.24	0.16	0.04	0.99	0.11
Control Delay	35.2	86.3	26.1	86.6	48.5	2.7	115.5	18.8	1.3	13.0	53.5	1.7
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	35.2	86.3	26.1	86.6	48.5	2.7	115.5	18.8	1.3	13.0	53.5	1.7
LOS	D	F	C	F	D	A	F	B	A	B	D	A
Approach Delay		64.8			61.1			30.7			50.1	
Approach LOS		E			E			C			D	

Intersection Summary

Cycle Length: 135

Actuated Cycle Length: 135

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

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 52.3

Intersection LOS: D

Intersection Capacity Utilization 95.6%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 3: SH-2 & 96th Ave



HCM 6th Signalized Intersection Summary

3: SH-2 & 96th Ave

2040 Total AM.syn

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	460	225	455	550	75	115	430	165	20	1575	95
Future Volume (veh/h)	40	460	225	455	550	75	115	430	165	20	1575	95
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	43	500	0	484	598	0	124	443	179	22	1712	103
Peak Hour Factor	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.97	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	203	526		512	948		123	1795	1034	439	1737	820
Arrive On Green	0.03	0.15	0.00	0.15	0.27	0.00	0.04	0.51	0.51	0.02	0.49	0.49
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1581	1781	3554	1581
Grp Volume(v), veh/h	43	500	0	484	598	0	124	443	179	22	1712	103
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1581	1781	1777	1581
Q Serve(g_s), s	2.7	18.8	0.0	18.7	20.0	0.0	5.0	9.5	6.0	0.8	64.1	4.5
Cycle Q Clear(g_c), s	2.7	18.8	0.0	18.7	20.0	0.0	5.0	9.5	6.0	0.8	64.1	4.5
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	203	526		512	948		123	1795	1034	439	1737	820
V/C Ratio(X)	0.21	0.95		0.95	0.63		1.01	0.25	0.17	0.05	0.99	0.13
Avail Cap(c_a), veh/h	216	526		512	948		123	1795	1034	468	1737	820
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.8	57.0	0.0	57.0	43.6	0.0	34.2	18.9	9.2	16.6	34.0	16.7
Incr Delay (d2), s/veh	0.5	27.1	0.0	26.7	1.4	0.0	83.7	0.3	0.4	0.0	18.4	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	1.3	10.4	0.0	10.1	9.0	0.0	4.8	4.1	2.1	0.3	31.3	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.3	84.1	0.0	83.6	45.0	0.0	117.9	19.2	9.5	16.7	52.4	17.1
LnGrp LOS	D	F		F	D		F	B	A	B	D	B
Approach Vol, veh/h	543		A	1082		A	746		1837			
Approach Delay, s/veh	81.2			62.3			33.3		50.0			
Approach LOS	F			E			C		D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.8	74.2	26.0	26.0	11.0	72.0	10.0	42.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	5.0	66.0	20.0	20.0	5.0	66.0	5.0	35.0				
Max Q Clear Time (g_c+l1), s	2.8	11.5	20.7	20.8	7.0	66.1	4.7	22.0				
Green Ext Time (p_c), s	0.0	4.0	0.0	0.0	0.0	0.0	0.0	3.3				
Intersection Summary												
HCM 6th Ctrl Delay			54.2									
HCM 6th LOS			D									
Notes												

Timings
3: SH-2 & 96th Ave

2040 Total PM.syn

09/08/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	630	155	210	480	50	160	1440	480	95	560	45
Future Volume (vph)	125	630	155	210	480	50	160	1440	480	95	560	45
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	7	4		3	8		5	2	3	1	6	7
Permitted Phases	4		4			8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	3	1	6	7
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)	11.0	24.0	24.0	11.0	24.0	24.0	11.0	24.0	11.0	11.0	24.0	11.0
Total Split (s)	14.0	31.0	31.0	15.0	32.0	32.0	15.0	63.0	15.0	11.0	59.0	14.0
Total Split (%)	11.7%	25.8%	25.8%	12.5%	26.7%	26.7%	12.5%	52.5%	12.5%	9.2%	49.2%	11.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	None
Act Effect Green (s)	32.9	24.9	24.9	9.0	25.9	25.9	65.8	57.0	66.0	58.4	53.3	67.3
Actuated g/C Ratio	0.27	0.21	0.21	0.08	0.22	0.22	0.55	0.48	0.55	0.49	0.44	0.56
v/c Ratio	0.58	0.93	0.36	0.89	0.65	0.12	0.41	0.93	0.58	0.75	0.39	0.05
Control Delay	40.8	67.3	8.3	88.5	47.4	0.6	15.7	40.9	14.9	51.6	23.4	0.9
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	40.8	67.3	8.3	88.5	47.4	0.6	15.7	40.9	14.9	51.6	23.4	0.9
LOS	D	E	A	F	D	A	B	D	B	D	C	A
Approach Delay		53.6			56.2			32.9			25.8	
Approach LOS		D			E			C			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 39.9

Intersection LOS: D

Intersection Capacity Utilization 88.5%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 3: SH-2 & 96th Ave

											
Ø1	Ø2 (R)		Ø3	Ø4		Ø5	Ø6 (R)	Ø7	Ø8		
11 s	63 s		15 s	31 s		15 s	59 s	14 s	32 s		

HCM 6th Signalized Intersection Summary

3: SH-2 & 96th Ave

2040 Total PM.syn

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	630	155	210	480	50	160	1440	480	95	560	45
Future Volume (veh/h)	125	630	155	210	480	50	160	1440	480	95	560	45
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	136	685	0	228	495	0	174	1565	522	103	609	49
Peak Hour Factor	0.92	0.92	0.92	0.92	0.97	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	259	736		259	766		443	1692	873	147	1595	817
Arrive On Green	0.07	0.21	0.00	0.08	0.22	0.00	0.07	0.48	0.48	0.04	0.45	0.45
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1584	1781	3554	1584
Grp Volume(v), veh/h	136	685	0	228	495	0	174	1565	522	103	609	49
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1584	1781	1777	1584
Q Serve(g_s), s	7.2	22.7	0.0	7.8	15.2	0.0	6.3	49.5	26.5	3.8	13.7	1.9
Cycle Q Clear(g_c), s	7.2	22.7	0.0	7.8	15.2	0.0	6.3	49.5	26.5	3.8	13.7	1.9
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	259	736		259	766		443	1692	873	147	1595	817
V/C Ratio(X)	0.53	0.93		0.88	0.65		0.39	0.92	0.60	0.70	0.38	0.06
Avail Cap(c_a), veh/h	259	740		259	770		453	1692	873	147	1595	817
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.3	46.7	0.0	55.0	42.9	0.0	16.5	29.4	18.0	28.1	22.0	14.5
Incr Delay (d2), s/veh	2.0	18.3	0.0	27.4	1.9	0.0	0.6	10.1	3.0	13.9	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	3.3	11.9	0.0	4.4	6.9	0.0	2.6	22.8	10.1	2.1	5.8	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.2	65.0	0.0	82.3	44.8	0.0	17.0	39.5	21.0	42.0	22.7	14.7
LnGrp LOS	D	E		F	D		B	D	C	D	C	B
Approach Vol, veh/h	821		A	723		A	2261				761	
Approach Delay, s/veh	60.4			56.6			33.5				24.8	
Approach LOS	E			E			C				C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	63.1	15.0	30.9	14.3	59.9	14.0	31.9				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	5.0	57.0	9.0	25.0	9.0	53.0	8.0	26.0				
Max Q Clear Time (g_c+l1), s	5.8	51.5	9.8	24.7	8.3	15.7	9.2	17.2				
Green Ext Time (p_c), s	0.0	4.7	0.0	0.1	0.0	4.9	0.0	2.1				
Intersection Summary												
HCM 6th Ctrl Delay			40.5									
HCM 6th LOS			D									
Notes												

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	10	40	20	0	95
Future Vol, veh/h	0	10	40	20	0	95
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	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	0	11	43	22	0	103
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	54	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.3	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.39	-	-	-	-
Pot Cap-1 Maneuver	0	991	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	991	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	8.7	0		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	991		-		
HCM Lane V/C Ratio	-	0.011		-		
HCM Control Delay (s)	-	8.7		-		
HCM Lane LOS	-	A		-		
HCM 95th %tile Q(veh)	-	0		-		

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	25	55	5	0	95
Future Vol, veh/h	0	25	55	5	0	95
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	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	0	27	60	5	0	103
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	63	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.3	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.39	-	-	-	-
Pot Cap-1 Maneuver	0	980	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	980	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	8.8	0		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	980		-		
HCM Lane V/C Ratio	-	0.028		-		
HCM Control Delay (s)	-	8.8		-		
HCM Lane LOS	-	A		-		
HCM 95th %tile Q(veh)	-	0.1		-		

Intersection						
Int Delay, s/veh	0.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	10	45	20	0	115
Future Vol, veh/h	0	10	45	20	0	115
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	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	0	11	49	22	0	125
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	60	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.3	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.39	-	-	-	-
Pot Cap-1 Maneuver	0	983	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	983	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	8.7	0		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	- 983		-		
HCM Lane V/C Ratio	-	- 0.011		-		
HCM Control Delay (s)	-	- 8.7		-		
HCM Lane LOS	-	- A		-		
HCM 95th %tile Q(veh)	-	- 0		-		

Intersection						
Int Delay, s/veh	1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	25	70	5	0	120
Future Vol, veh/h	0	25	70	5	0	120
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	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	0	27	76	5	0	130
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	79	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.3	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.39	-	-	-	-
Pot Cap-1 Maneuver	0	960	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	960	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	8.9	0		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	960		-		
HCM Lane V/C Ratio	-	0.028		-		
HCM Control Delay (s)	-	8.9		-		
HCM Lane LOS	-	A		-		
HCM 95th %tile Q(veh)	-	0.1		-		

Intersection						
Int Delay, s/veh	2.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T	T	T	T
Traffic Vol, veh/h	20	5	55	50	30	65
Future Vol, veh/h	20	5	55	50	30	65
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	-	-	150	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	22	5	60	54	33	71
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	197	60	0	0	114	0
Stage 1	60	-	-	-	-	-
Stage 2	137	-	-	-	-	-
Critical Hdwy	6.5	6.3	-	-	4.2	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.39	-	-	2.29	-
Pot Cap-1 Maneuver	774	983	-	-	1427	-
Stage 1	943	-	-	-	-	-
Stage 2	870	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	756	983	-	-	1427	-
Mov Cap-2 Maneuver	756	-	-	-	-	-
Stage 1	943	-	-	-	-	-
Stage 2	850	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	9.7	0		2.4		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	793	1427	-	
HCM Lane V/C Ratio	-	-	0.034	0.023	-	
HCM Control Delay (s)	-	-	9.7	7.6	-	
HCM Lane LOS	-	-	A	A	-	
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-	

Intersection						
Int Delay, s/veh	3.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	70	5	55	15	10	85
Future Vol, veh/h	70	5	55	15	10	85
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	-	-	150	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	76	5	60	16	11	92
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	174	60	0	0	76	0
Stage 1	60	-	-	-	-	-
Stage 2	114	-	-	-	-	-
Critical Hdwy	6.5	6.3	-	-	4.2	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.39	-	-	2.29	-
Pot Cap-1 Maneuver	798	983	-	-	1474	-
Stage 1	943	-	-	-	-	-
Stage 2	891	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	792	983	-	-	1474	-
Mov Cap-2 Maneuver	792	-	-	-	-	-
Stage 1	943	-	-	-	-	-
Stage 2	885	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	10	0		0.8		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	802		1474	-	
HCM Lane V/C Ratio	-	0.102		0.007	-	
HCM Control Delay (s)	-	10		7.5	-	
HCM Lane LOS	-	B		A	-	
HCM 95th %tile Q(veh)	-	0.3		0	-	

Intersection						
Int Delay, s/veh	1.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	5	60	50	30	85
Future Vol, veh/h	20	5	60	50	30	85
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	-	-	150	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	22	5	65	54	33	92
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	223	65	0	0	119	0
Stage 1	65	-	-	-	-	-
Stage 2	158	-	-	-	-	-
Critical Hdwy	6.5	6.3	-	-	4.2	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.39	-	-	2.29	-
Pot Cap-1 Maneuver	748	977	-	-	1421	-
Stage 1	938	-	-	-	-	-
Stage 2	851	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	731	977	-	-	1421	-
Mov Cap-2 Maneuver	731	-	-	-	-	-
Stage 1	938	-	-	-	-	-
Stage 2	831	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	9.8	0		2		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	770	1421	-	
HCM Lane V/C Ratio	-	-	0.035	0.023	-	
HCM Control Delay (s)	-	-	9.8	7.6	-	
HCM Lane LOS	-	-	A	A	-	
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-	

Intersection						
Int Delay, s/veh	3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	70	5	70	15	10	110
Future Vol, veh/h	70	5	70	15	10	110
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	-	-	150	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	76	5	76	16	11	120
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	218	76	0	0	92	0
Stage 1	76	-	-	-	-	-
Stage 2	142	-	-	-	-	-
Critical Hdwy	6.5	6.3	-	-	4.2	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.39	-	-	2.29	-
Pot Cap-1 Maneuver	753	963	-	-	1454	-
Stage 1	927	-	-	-	-	-
Stage 2	866	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	747	963	-	-	1454	-
Mov Cap-2 Maneuver	747	-	-	-	-	-
Stage 1	927	-	-	-	-	-
Stage 2	859	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	10.3	0		0.6		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	758	1454	-	
HCM Lane V/C Ratio	-	-	0.108	0.007	-	
HCM Control Delay (s)	-	-	10.3	7.5	-	
HCM Lane LOS	-	-	B	A	-	
HCM 95th %tile Q(veh)	-	-	0.4	0	-	

APPENDIX E

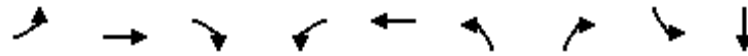
Queueing Analysis Worksheets

Queues

2022 Total AM.syn

1: Joliet Ave & 104th Ave

09/08/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Group Flow (vph)	7	866	172	174	1014	51	80	20	20
v/c Ratio	0.02	0.42	0.17	0.41	0.40	0.25	0.19	0.12	0.06
Control Delay	5.2	10.4	2.1	8.0	7.3	26.6	1.0	24.7	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.2	10.4	2.1	8.0	7.3	26.6	1.0	24.7	0.4
Queue Length 50th (ft)	1	94	0	14	58	21	0	8	0
Queue Length 95th (ft)	4	178	22	40	218	32	0	12	0
Internal Link Dist (ft)		954			918				231
Turn Bay Length (ft)	325			425		175	250	100	
Base Capacity (vph)	403	2076	1005	429	2540	230	453	161	327
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	0.02	0.42	0.17	0.41	0.40	0.22	0.18	0.12	0.06
Intersection Summary									

Queues
1: Joliet Ave & 104th Ave

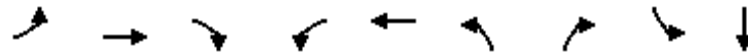
2022 Total PM.syn
09/08/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Group Flow (vph)	110	1050	60	74	1004	146	139	10	35
v/c Ratio	0.32	0.50	0.06	0.23	0.48	0.52	0.28	0.06	0.11
Control Delay	8.5	13.3	0.1	7.8	13.0	29.9	1.4	20.8	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	13.3	0.1	7.8	13.0	29.9	1.4	20.8	0.7
Queue Length 50th (ft)	11	137	0	8	131	60	0	4	0
Queue Length 95th (ft)	22	259	0	17	244	70	0	7	0
Internal Link Dist (ft)		954			918				231
Turn Bay Length (ft)	325			425		175	250	100	
Base Capacity (vph)	348	2100	994	326	2087	330	517	204	317
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	0.32	0.50	0.06	0.23	0.48	0.44	0.27	0.05	0.11
Intersection Summary									

Queues
1: Joliet Ave & 104th Ave

2040 Total AM.syn

09/08/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Group Flow (vph)	11	1124	201	168	1260	43	54	11	5
v/c Ratio	0.03	0.50	0.19	0.46	0.45	0.23	0.15	0.09	0.02
Control Delay	4.3	9.8	2.1	10.1	6.5	28.8	0.9	27.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.3	9.8	2.1	10.1	6.5	28.8	0.9	27.0	0.0
Queue Length 50th (ft)	1	136	0	13	78	18	0	5	0
Queue Length 95th (ft)	7	253	31	#66	298	38	0	15	0
Internal Link Dist (ft)		954			918				231
Turn Bay Length (ft)	325			425		175	250	100	
Base Capacity (vph)	346	2241	1076	365	2809	217	391	128	310
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	0.03	0.50	0.19	0.46	0.45	0.20	0.14	0.09	0.02

Intersection Summary

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

Queues
1: Joliet Ave & 104th Ave

2040 Total PM.syn

09/08/2020

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT
Lane Group Flow (vph)	71	1332	60	54	1282	141	158	5	22
v/c Ratio	0.30	0.65	0.06	0.23	0.66	0.52	0.33	0.03	0.07
Control Delay	9.4	15.8	0.1	8.4	16.4	30.1	1.8	20.0	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	15.8	0.1	8.4	16.4	30.1	1.8	20.0	0.5
Queue Length 50th (ft)	7	194	0	5	184	58	0	2	0
Queue Length 95th (ft)	29	#412	0	24	#387	88	0	9	0
Internal Link Dist (ft)		954			918				231
Turn Bay Length (ft)	325			425		175	250	100	
Base Capacity (vph)	240	2043	972	238	1940	324	509	206	301
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	0.30	0.65	0.06	0.23	0.66	0.44	0.31	0.02	0.07

Intersection Summary

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

Queues
3: SH-2 & 96th Ave

2022 Total AM.syn

09/08/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	44	423	227	372	552	76	102	345	189	23	1435	83
v/c Ratio	0.18	0.71	0.53	0.91	0.52	0.13	0.62	0.22	0.24	0.05	1.01	0.11
Control Delay	24.6	53.5	14.3	56.1	37.1	0.6	37.0	22.4	4.1	16.7	63.6	0.3
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	24.6	53.5	14.3	56.1	37.1	0.6	37.0	22.4	4.1	16.7	63.6	0.3
Queue Length 50th (ft)	21	162	24	215	188	0	41	93	0	9	~642	0
Queue Length 95th (ft)	32	196	59	#352	201	0	#129	131	8	17	#705	0
Internal Link Dist (ft)		757			1619			522			456	
Turn Bay Length (ft)	350		525	500		275	375		275	375		300
Base Capacity (vph)	302	707	469	411	1069	566	164	1590	802	487	1416	748
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	0.15	0.60	0.48	0.91	0.52	0.13	0.62	0.22	0.24	0.05	1.01	0.11

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.

Queues
3: SH-2 & 96th Ave

2022 Total PM.syn

09/08/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	130	583	169	183	381	50	160	1225	446	100	565	60
v/c Ratio	0.43	0.76	0.36	0.84	0.51	0.11	0.37	0.78	0.52	0.53	0.37	0.08
Control Delay	32.0	50.6	7.5	61.9	43.8	0.5	16.4	33.2	10.4	25.9	24.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.0	50.6	7.5	61.9	43.8	0.5	16.4	33.2	10.4	25.9	24.7	0.2
Queue Length 50th (ft)	71	223	0	103	138	0	58	425	74	35	157	0
Queue Length 95th (ft)	90	255	26	#176	181	0	86	533	138	55	174	0
Internal Link Dist (ft)		757			1619			522			456	
Turn Bay Length (ft)	350		525	500		275	375		275	375		300
Base Capacity (vph)	307	884	522	218	855	480	442	1576	858	190	1524	759
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	0.42	0.66	0.32	0.84	0.45	0.10	0.36	0.78	0.52	0.53	0.37	0.08

Intersection Summary

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

Queues
3: SH-2 & 96th Ave

2040 Total AM.syn

09/08/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	43	500	245	484	598	82	124	443	179	22	1712	103
v/c Ratio	0.24	0.95	0.65	0.95	0.65	0.17	1.02	0.24	0.16	0.04	0.99	0.11
Control Delay	35.2	86.3	26.1	86.6	48.5	2.7	115.5	18.8	1.3	13.0	53.5	1.7
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	35.2	86.3	26.1	86.6	48.5	2.7	115.5	18.8	1.3	13.0	53.5	1.7
Queue Length 50th (ft)	25	232	60	219	247	0	-67	116	0	8	764	0
Queue Length 95th (ft)	54	#343	155	#328	313	15	#202	153	23	21	#950	18
Internal Link Dist (ft)		757			1619			522			456	
Turn Bay Length (ft)	350		525	500		275	375		275	375		300
Base Capacity (vph)	181	524	379	508	917	494	121	1845	1101	501	1730	954
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	0.24	0.95	0.65	0.95	0.65	0.17	1.02	0.24	0.16	0.04	0.99	0.11

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.

Queues
3: SH-2 & 96th Ave

2040 Total PM.syn

09/08/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	136	685	168	228	495	54	174	1565	522	103	609	49
v/c Ratio	0.58	0.93	0.36	0.89	0.65	0.12	0.41	0.93	0.58	0.75	0.39	0.05
Control Delay	40.8	67.3	8.3	88.5	47.4	0.6	15.7	40.9	14.9	51.6	23.4	0.9
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	40.8	67.3	8.3	88.5	47.4	0.6	15.7	40.9	14.9	51.6	23.4	0.9
Queue Length 50th (ft)	76	276	0	91	184	0	62	584	187	35	164	0
Queue Length 95th (ft)	127	#390	58	#165	244	0	99	#753	280	#122	211	6
Internal Link Dist (ft)		757			1619			522			456	
Turn Bay Length (ft)	350		525	500		275	375		275	375		300
Base Capacity (vph)	235	737	462	257	766	444	426	1681	897	137	1572	924
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	0.58	0.93	0.36	0.89	0.65	0.12	0.41	0.93	0.58	0.75	0.39	0.05

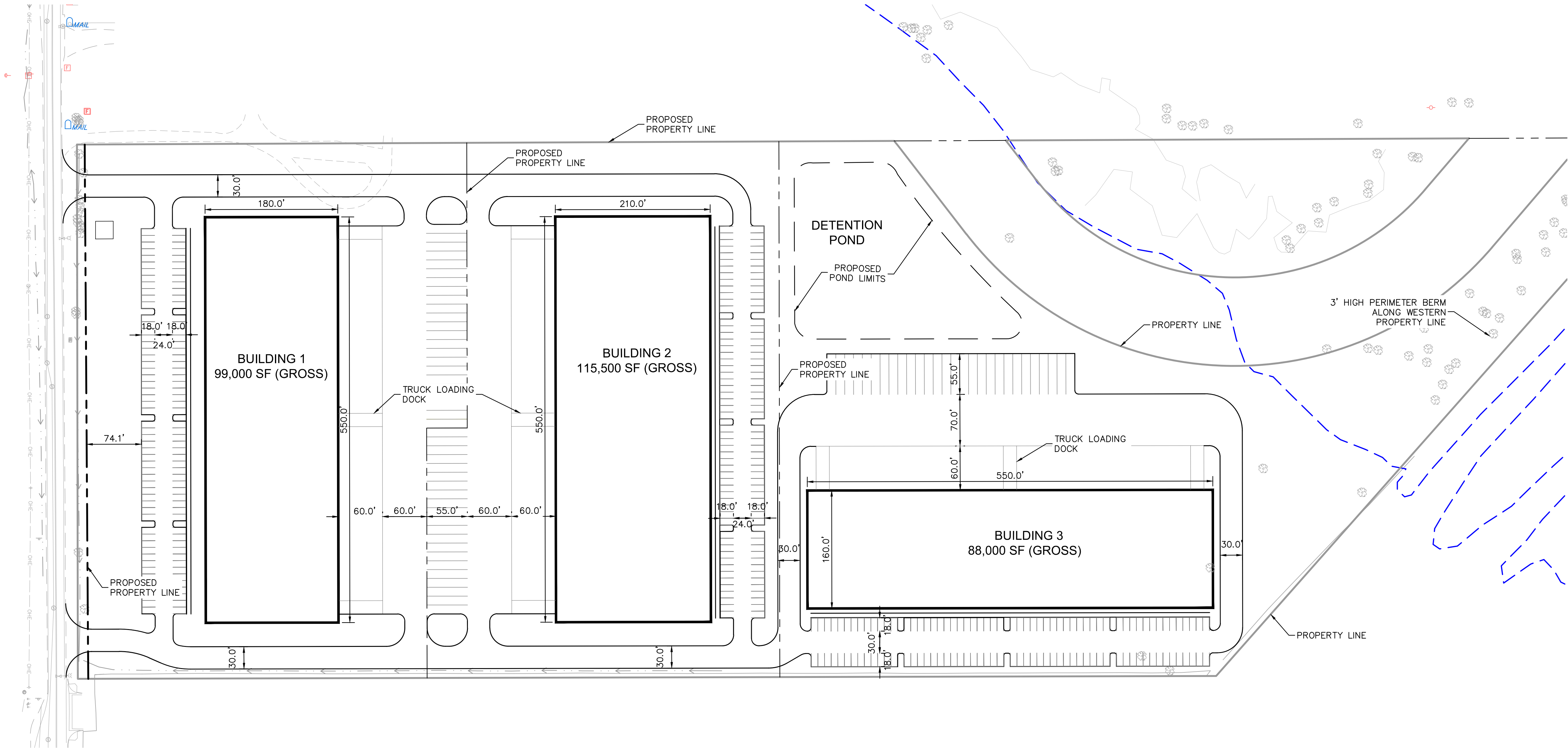
Intersection Summary

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

APPENDIX F

Conceptual Site Plan

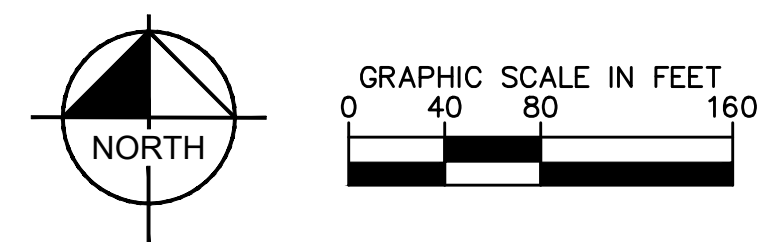
C:\Project Files\096441009 - 100th & Havana\CADD\PlanSheets\1 SITE PLAN.dwg McCullough, Craig 4/9/2020 9:14 AM



SITE DATA

PARKING = 324 SPACES
TRUCK PARKING = 70 SPACES

TOTAL AREA= 26.60 AC
DEDICATED ROW AREA= 0.21 AC
FINAL PROPERTY AREA = 26.39 AC
NEW IMPERVIOUS AREA= 18.53 AC



100TH & HAVANA
COMMERCE CITY, COLORADO
SITE PLAN

Kimley»»Horn

Kimley»Horn

DESIGNED BY: BJC
DRAWN BY: JRB
CHECKED BY: RJP
DATE: 12/20/2019

PRELIMINARY
FOR REVIEW ONLY
NOT FOR
CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.

DRAWING NAME

1[illegible]