Bellaire Boulevard

Traffic Engineering Report

Prepared For

International District

November 2009

AECOM

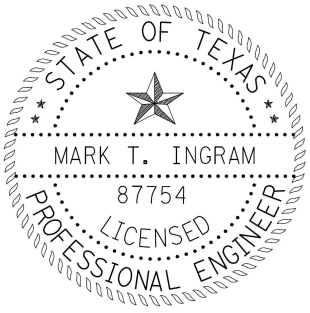
Traffic Engineering Study

Bellaire Boulevard

Prepared For:

International Management District

AECOM Technical Services, Inc.
Texas Registered Engineering Firm F-3580



November 2009

Executive Summary

AECOM has been requested by the International Management District (IMD) to conduct a traffic engineering study along Bellaire Boulevard, from Cook Road to Turtlewood Drive, located in Houston, Texas. The purpose of this traffic engineering study is to analyze existing traffic conditions along the Bellaire Boulevard corridor, propose operational improvements, and determine the measures of effectiveness (MOE) for those improvements.

Bellaire Boulevard provides east-west access through the IMD between State Highway 6 and the West Sam Houston Tollway. In addition to the commercial developments in the vicinity of Bellaire Boulevard, large residential neighborhoods exist to the north and south along the length of the corridor. Halliburton Energy Services Group is located at the corner of Beltway 8 and Bellaire Boulevard and Alief Independent School District has four educational facilities located north of the intersection of Bellaire Boulevard and Cook Road.

Field observations were performed at the project location and turning movement counts were performed at all six signalized intersections in the study corridor. In order to develop year 2019 projected turning movement counts, existing traffic volumes were adjusted to year 2019 using a 1.55 percent annual growth rate. A traffic operations analysis was performed for the Bellaire Boulevard corridor using Synchro 7.0 in order to determine and compare the operational impacts on Bellaire Boulevard of the potential improvements.

Field observations revealed congestion in the morning peak hour particularly on southbound Cook Road at Bellaire Boulevard due to Alief ISD school campuses. During the PM peak period, westbound traffic volume was heavy, but through capacity appeared adequate. Major traffic operational issues were observed near the intersections of Bellaire Boulevard with Boone Road, Wilcrest Drive and Kirkwood Road due to heavy left turn demands causing spillover from the left-turn storage bays, which blocked through traffic and reduced the through capacity of the intersections. Also, left-turn traffic at several mid-block median openings where storage bays are not present caused through traffic blockages.

To address these operational issues, the following improvements are proposed:

Wilcrest Drive at Bellaire Boulevard

- Add a right turn storage bay for westbound traffic
- Close the first median opening east of the intersection

Boone Road at Bellaire Boulevard

- Add an additional left turn storage bay for westbound traffic
- Extend the southbound left turn storage bay
- Add a left turn storage bay for the first median opening west of Boone Road

Belle Park Drive and Bellaire Boulevard

- Re-stripe the southbound approach at Belle Park Drive

South Kirkwood Road and Bellaire Boulevard

- Left turn bay for the first median opening west of South Kirkwood

Cook Road and Bellaire Boulevard

- Extend the southbound left turn storage bay on Cook Road

The level of service (LOS) analysis results show that the proposed improvements will reduce the vehicular delay at the intersections of Bellaire Boulevard with Boone Road and Wilcrest Drive during the PM peak hour, improving the LOS from E to D. These improvements also slightly reduce delay during the AM peak hour by allowing more green time to be allocated to critical movements.

In order to determine if the proposed improvements maintain their effectiveness over time, 2019 traffic volumes were modeled on the existing and proposed geometry for the AM and PM peak hours. During the PM peak hour, the proposed storage bays reduce the delay for Wilcrest Drive and Boone Road in the 2019 conditions; however, LOS E and F are still maintained. Westbound through demand during the PM peak hour in the vicinity of Boone Road and Wilcrest Drive exceeds capacity. Longer green time could be allotted to this movement; however, this solution would cause excessive side street delays while only marginally improving westbound operations.

Therefore, the construction of a fourth westbound through lane between Turtlewood Drive and Belle Park Road, using a portion of the existing median, is proposed. The results of the analysis show that the proposed westbound lane improved LOS from F to D at the Bellaire Boulevard at Boone Road intersection and improved LOS from E to D at the Bellaire Boulevard at Wilcrest Drive intersection.

Given the results of the LOS analysis, it is recommended that the proposed turning bays be constructed. This will provide adequate short-term improvement for traffic flow through the study area.

To prevent conflicts in the proposed right turn bay at Wilcrest Drive it is recommended to close the median opening immediately east of the intersection. This will prevent drivers from blocking through traffic in the eastbound and westbound directions while making a left turn into the commercial center on the northeast corner. It should be noted that even by closing the median opening immediately east of the intersection, drivers heading eastbound will still be able to access the commercial center via the left turn bay at the next median opening to the east. Motorists can also access the center by turning left at the Wilcrest signal and turning right into the center.

Adding thru capacity on Bellaire Boulevard does not appear to be necessary in the near future. However, additional capacity (for the westbound movement particularly) will likely be necessary by year 2019 as the projected volumes cause large delays along Bellaire Boulevard in the westbound direction. The additional lane should extend from just east of Turtlewood Drive and terminate as a right-turn only lane at Belle Park Drive. This proposed improvement is not listed in the H-GAC Transportation Improvement Plan (TIP) nor is it listed a short-term improvement in the Regional Transportation Plan (RTP). The RTP lists smart street improvements for Bellaire Boulevard as a long-term project with a let date of 2023.

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1.0 Introduction

AECOM has been requested by the International Management District (IMD) to conduct a traffic engineering study along Bellaire Boulevard, from Cook Road to Turtlewood Drive, located in Houston, Texas. The purpose of this traffic engineering study is to analyze existing traffic conditions along the Bellaire Boulevard corridor, propose operational improvements, and determine the measures of effectiveness (MOE) for those improvements.

The traffic engineering analysis utilizes the methods outlined in the 2004 edition of the American Association of State Highway Transportation Officials (AASHTO) Geometric Design of Highways and Streets and the 2000 edition of the Highway Capacity Manual (HCM).

1.1 Project Location

The Bellaire Boulevard study corridor is a 1.7 mile segment of a major east-west arterial traversing a heavily populated commercial and residential area. Within the study area, Bellaire Boulevard is signalized at the following intersections:

- Turtlewood Drive
- Wilcrest Drive
- Boone Road
- Belle Park Drive
- South Kirkwood Road
- Cook Road

Bellaire Boulevard provides east-west access through the IMD between State Highway 6 and the West Sam Houston Tollway. In addition to the commercial developments in the vicinity of Bellaire Boulevard, large residential neighborhoods exist to the north and south along the length of the corridor. Halliburton Energy Services Group is located at the corner of Beltway 8 and Bellaire Boulevard. Alief Independent School District has four educational facilities located north of the intersection of Bellaire Boulevard and Cook Road.

Figure 1 illustrates the project vicinity and surrounding roadway network.

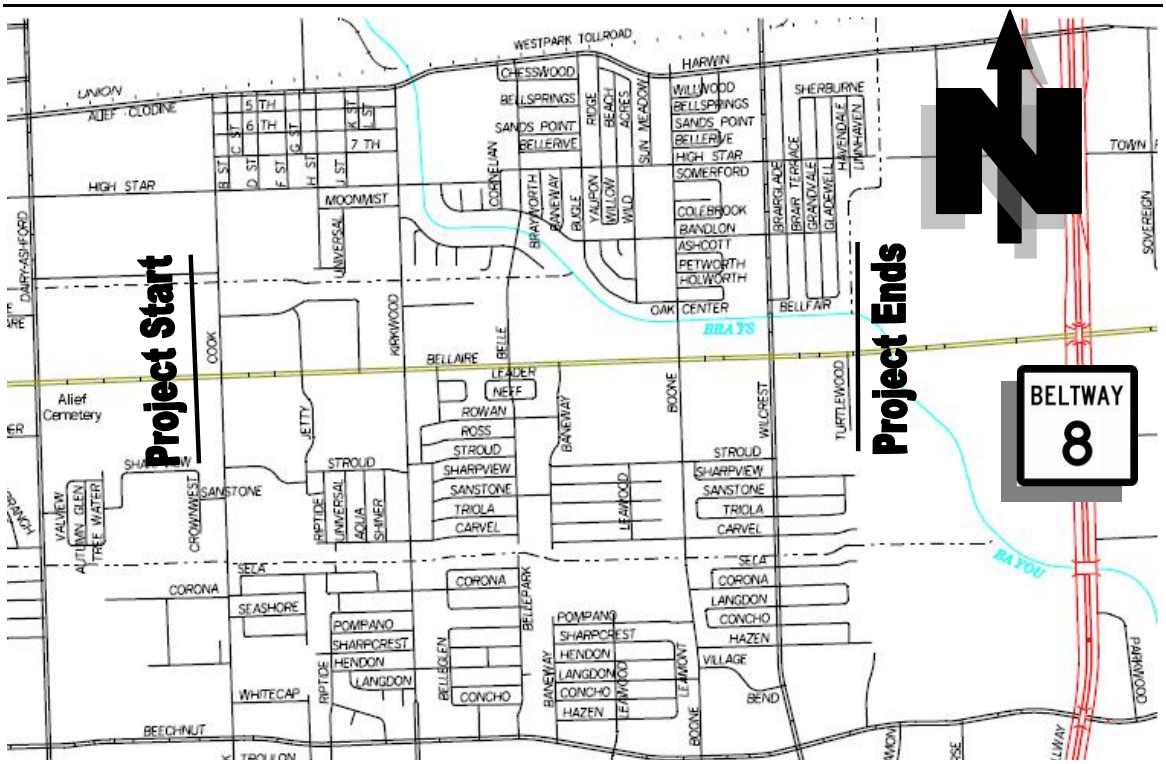


Figure 1. Site Location and the Surrounding Roadway Network.

Study Methodology

A general summary of the methodology adopted for the traffic engineering study of the Bellaire Boulevard corridor is listed below:

Field observations – Field observations were performed at the project location and its vicinity to determine the existing roadway and geometric conditions, lane assignments, traffic control and operations, speed limits, and other site characteristics that could affect the traffic operations, and feasibility of recommendations at the study location.

Data Collection - Turning movement counts (TMC) were performed at all six signalized intersections in the study corridor. TMC data for the intersections was collected during the month of October, 2009, by SP Engineering, Inc. Intersection TMC data was collected from 6:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. Detailed TMC data is located in **Appendix A**.

In order to develop year 2019 projected turning movement counts, existing traffic volumes were adjusted to year 2019 using a 1.55 percent annual growth rate. This growth rate was obtained using the projected daily traffic along Bellaire Boulevard calculated by the Houston-Galveston Area Council (H-GAC) 2035 travel demand model. Detailed growth rate calculations are located in **Appendix A**.

Traffic Operations Analysis – A traffic operations analysis was performed for the Bellaire Boulevard corridor using Synchro 7.0, which is based on the 2000 Edition of the *Highway Capacity Manual*, in order to determine and compare the operational impacts on Bellaire Boulevard of each potential improvement or combinations of improvements.

2.0 Existing Conditions

A field investigation was performed at the project location and its vicinity to determine the existing geometric, roadway, and traffic conditions. Field observations included existing lane configurations, traffic control, signs, posted speed limits, pavement marking and markers, site development, overhead and underground utilities and other geometric features that could affect the traffic operations, and feasibility of recommendations at the study intersections

2.1 Bellaire Boulevard and Cook Road

The existing conditions at the intersection of Bellaire Boulevard at Cook Road are summarized below:

- The intersection at Bellaire Boulevard, running east/west, and Cook Road, running north/south, operates under full signal control.
- Bellaire Boulevard is a six-lane roadway with three travel lanes in each direction separated by a raised median. Both the eastbound and westbound approaches have a left turn bay, for a total of four lanes per approach.
- Bellaire Boulevard has a Portland cement concrete pavement and curb and gutter drainage. The posted speed limit on Bellaire Boulevard is 35 miles per hour (mph) in both directions.
- Cook Road is a four-lane roadway with two travel lanes in each direction separated by a raised median to the south of the intersection and a continuous left turn lane to the north. Both the northbound and southbound approaches have a left turn bay, for a total of three lanes per approach.
- Cook Road has a Portland cement concrete pavement and curb and gutter drainage. The speed limit on Cook Road is 35 mph in both directions.

Figure 2 details the existing layout of the intersection.

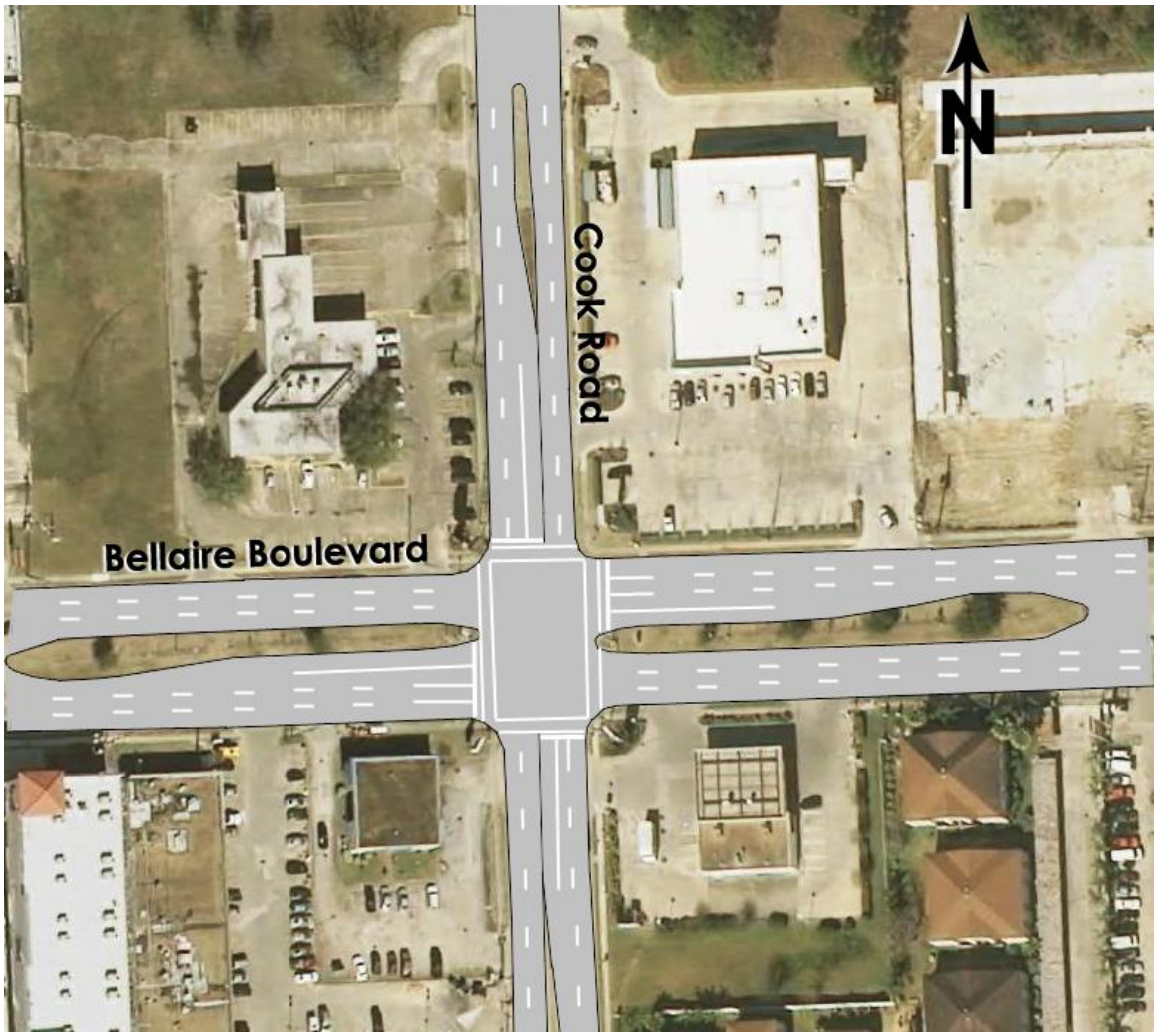


Figure 2: Bellaire Boulevard at Cook Road Intersection Layout

2.2 Bellaire Boulevard and South Kirkwood Road

The existing conditions at the intersection of Bellaire Boulevard at South Kirkwood Road are summarized below:

- The intersection at Bellaire Boulevard, running east/west, and South Kirkwood Road, running north/south, operates under full signal control.
- Bellaire Boulevard is a six-lane roadway with three travel lanes in each direction separated by a raised median. Both the eastbound and westbound approaches have a left turn bay, for a total of four lanes per approach.
- Bellaire Boulevard has a Portland cement concrete pavement with curb and gutter drainage. The posted speed limit on Bellaire Boulevard is 35 mph in both directions.
- South Kirkwood Road is a four-lane roadway with two travel lanes in each direction separated by a raised median. Both the northbound and southbound approaches have a left turn bay, for a total of four lanes per approach.
- South Kirkwood Road has a Portland cement concrete pavement and curb and gutter drainage. The speed limit on South Kirkwood Road is 35 mph.

Figure 3 details the existing layout of the intersection.

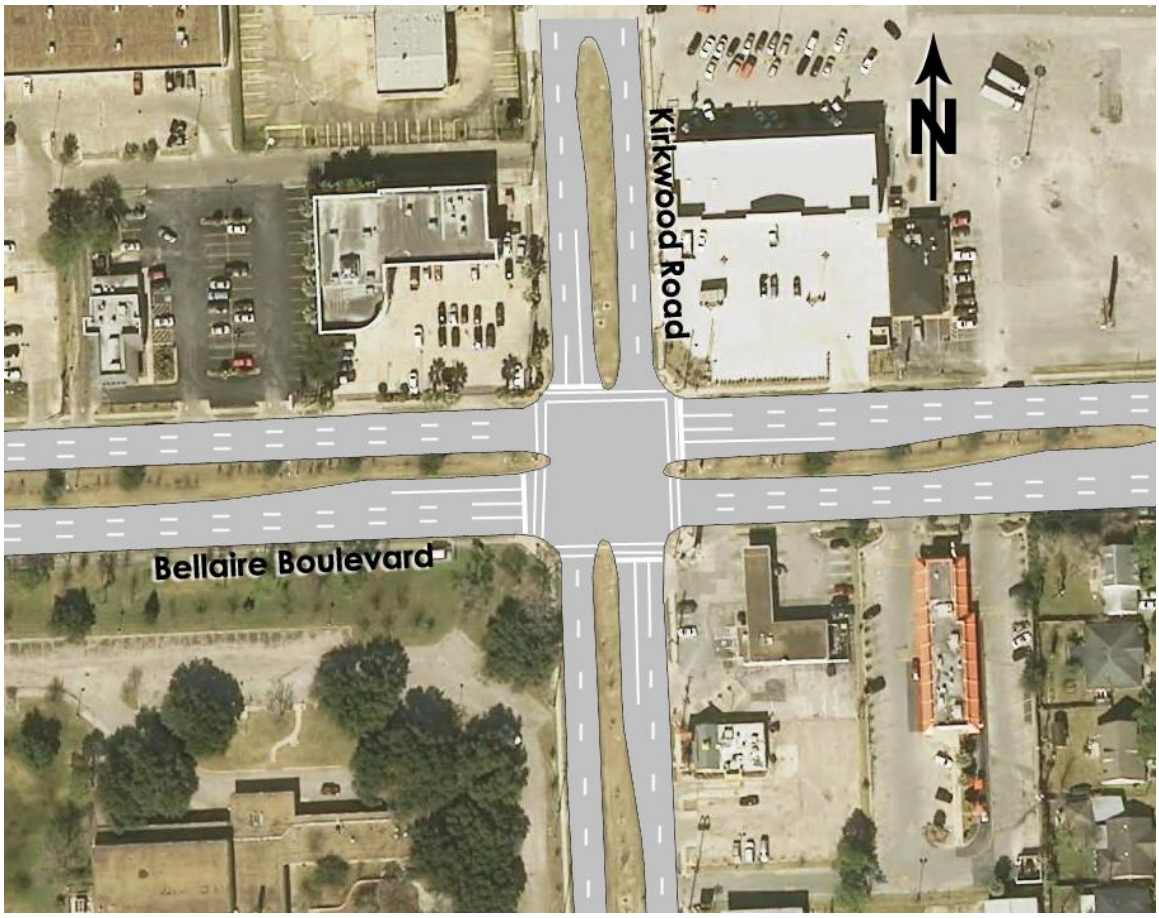


Figure 3: Bellaire Boulevard at South Kirkwood Road Intersection Layout

2.3 Bellaire Boulevard and Belle Park Drive

The existing conditions at the intersection of Bellaire Boulevard at Belle Park Drive are summarized below:

- The intersection at Bellaire Boulevard, running east/west, and Belle Park Drive, running north/south, operates under full signal control.
- Bellaire Boulevard is a six-lane roadway with three travel lanes in each direction separated by a raised median. Both the eastbound and westbound approaches have a left turn bay, for a total of four lanes per approach.
- Bellaire Boulevard has a Portland cement concrete pavement with curb and gutter drainage. The posted speed limit on Bellaire Boulevard is 35 mph in both directions.
- Belle Park Drive is a two-lane roadway with one travel lane in each direction separated by a raised median to the south of the intersection. Further south of the intersection and to the north of the intersection there are no markings or physical barriers separating oncoming traffic. The northbound approach has a shared thru-left lane and a right turn bay for a total of two lanes. The southbound approach has a shared thru-left-right lane for a total of one lane.
- Belle Park Drive has a Portland cement concrete pavement and curb and gutter drainage. The speed limit on Belle Park Drive is 30 mph in both directions.

Figure 4 details the existing layout of the intersection.

Figure 4: Bellaire Boulevard at Belle Park Drive Intersection Layout

2.4 Bellaire Boulevard and Boone Road

The existing conditions at the intersection of Bellaire Boulevard at Boone Road are summarized below:

- The intersection at Bellaire Boulevard, running east/west, and Boone Road, running north/south, operates under full signal control.
- Bellaire Boulevard is a six-lane roadway with three travel lanes in each direction separated by a raised median. Both the eastbound and westbound approaches have a left turn bay, for a total of four lanes per approach.
- Bellaire Boulevard has a Portland cement concrete pavement with curb and gutter drainage. The posted speed limit on Bellaire Boulevard is 35 mph in both directions.
- Boone Road is a four-lane roadway with two travel lanes in each direction separated by a double solid yellow centerline. Both the northbound and southbound approaches have a left turn bay, for a total of three lanes per approach.
- Boone Road has a Portland cement concrete pavement and curb and gutter drainage. The speed limit on Boone Road is 35 mph south of the intersection and 30 mph north of the intersection.

Figure 5 details the existing layout of the intersection.

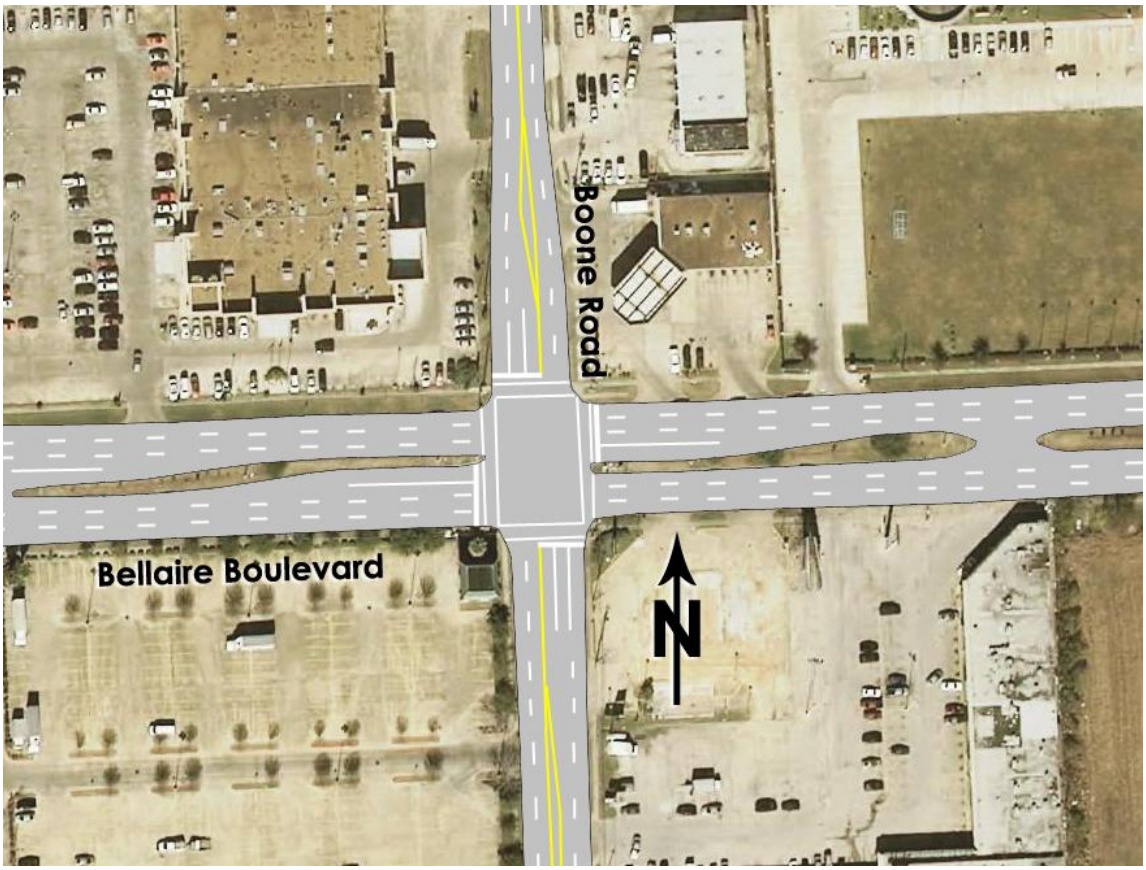


Figure 5: Bellaire Boulevard at Boone Road Intersection Layout

2.5 Bellaire Boulevard and Wilcrest Drive

The existing conditions at the intersection of Bellaire Boulevard at Wilcrest Drive are summarized below:

- The intersection at Bellaire Boulevard, running east/west, and Wilcrest Drive, running north/south, operates under full signal control.
- Bellaire Boulevard is a six-lane roadway with three travel lanes in each direction separated by a raised median. Both the eastbound and westbound approaches have a left turn bay, for a total of four lanes per approach. Eastbound traffic is not permitted to turn left between the hours of 6 a.m. to 9 a.m. Left turn movement for westbound traffic is not permitted between the hours of 4 p.m. to 7 p.m. These restrictions are in place during the week, Monday thru Friday. Both approaches exempt buses from this restriction.
- Bellaire Boulevard has a Portland cement concrete pavement with curb and gutter drainage. The posted speed limit on Bellaire Boulevard is 35 mph in both directions.
- Wilcrest Drive is a four-lane roadway with two travel lanes in each direction separated by a raised median. Both the northbound and southbound approaches have a left turn bay, for a total of three lanes per approach.
- Wilcrest Drive has a Portland cement concrete pavement and curb and gutter drainage. The speed limit on Wilcrest Drive is 35 mph in both directions.

Figure 6 details the existing layout of the intersection.

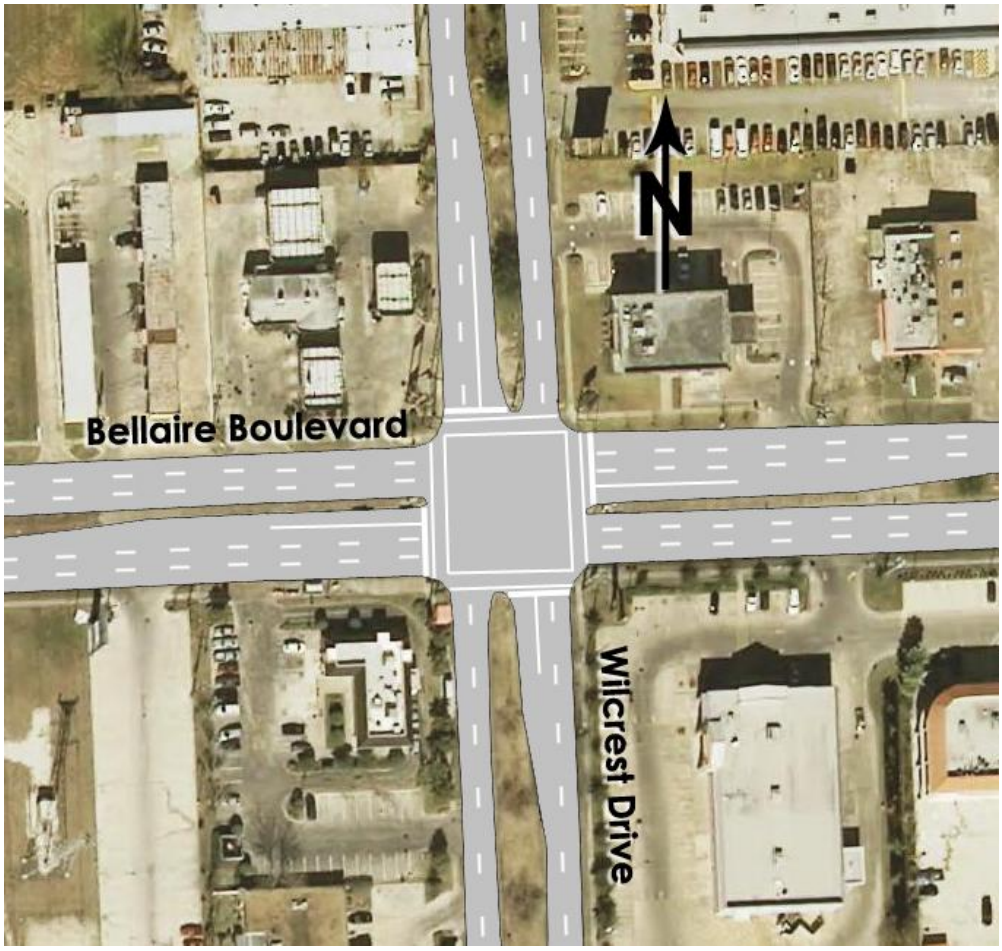


Figure 6: Bellaire Boulevard at Wilcrest Drive Intersection Layout

2.6 Bellaire Boulevard and Turtlewood Drive

The existing conditions at the intersection of Bellaire Boulevard at Turtlewood Drive are summarized below:

- The intersection at Bellaire Boulevard, running east/west, and Turtlewood Drive, running north/south, operates under full signal control.
- Bellaire Boulevard is a six-lane roadway with three travel lanes in each direction separated by a raised median. The eastbound approach has three thru lanes and does not permit left turns. The westbound approach has a left turn bay, for a total of four lanes.
- Bellaire Boulevard has a Portland cement concrete pavement with curb and gutter drainage. The posted speed limit on Bellaire Boulevard is 35 mph in both directions.
- Turtlewood Drive is a two-lane roadway south of the intersection. The roadway is separated by a raised median immediately south of the intersection. There is no barrier separating oncoming traffic after the median ends. The north side of Turtlewood Drive is a commercial driveway with a shared left-thru-right lane.
- Turtlewood Drive has a Portland cement concrete pavement and curb and gutter drainage. The speed limit on Turtlewood Drive is 30 mph in both directions.

Figure 7 details the existing layout of the intersection.

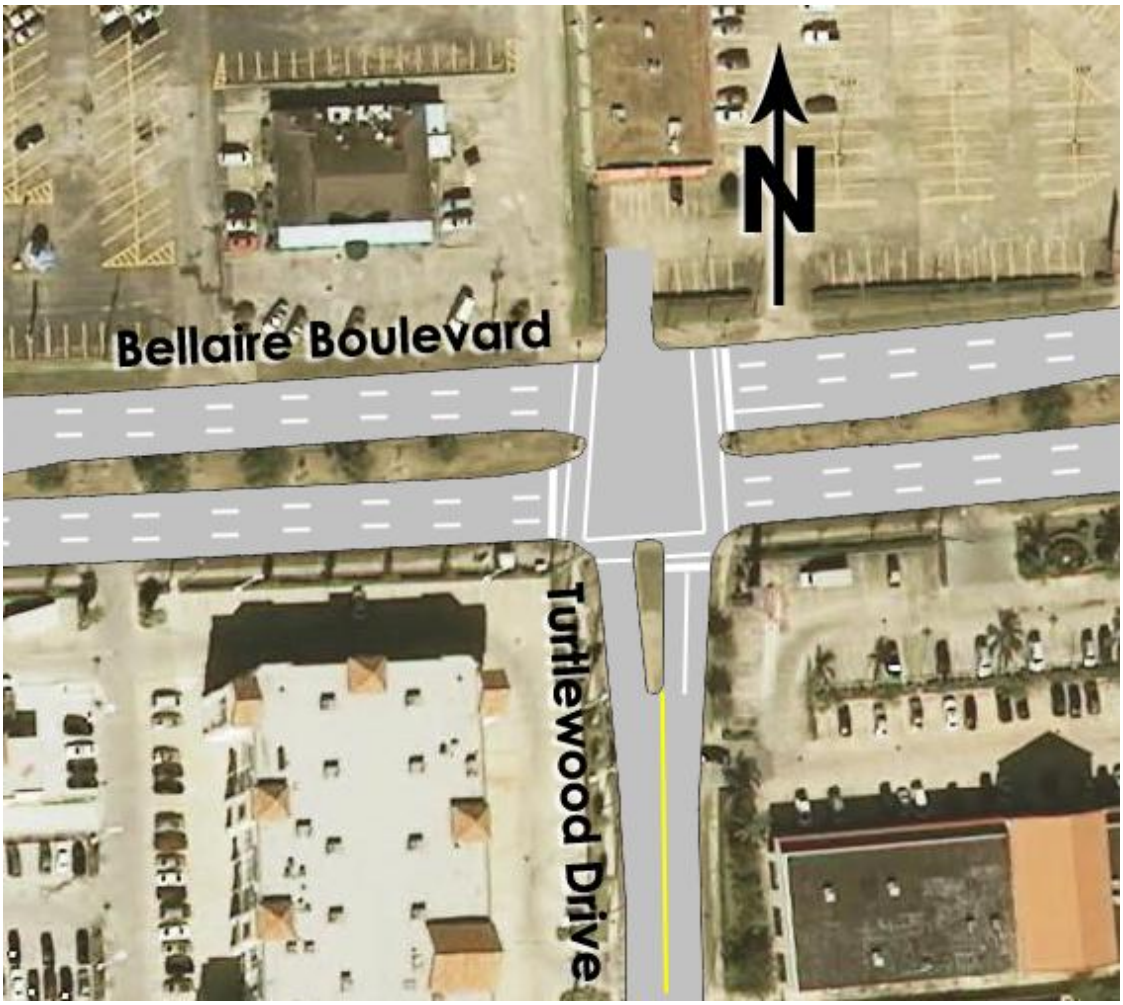


Figure 7: Bellaire Boulevard at Turtlewood Drive Intersection Layout

3.0 Data Collection and Analysis

Turning movement counts (TMC) were performed at all six signalized intersections located in the study area. TMC data was collected in October, 2009, by SP Engineering, Inc for the following time periods:

- 6:00 AM to 9:00 AM
- 4:00 PM to 6:00 PM

The TMC data at the study intersections was recorded for the 15 minute and hourly intervals. Detailed TMC data is located in **Appendix A**.

4.0 Site Observations

The following observations were made during visits to the corridor during the AM and PM peak hours:

- *Cook Road* – An increase in traffic volume on Cook Road between 7:00 a.m. and 7:30 a.m. is caused by the Alief School District facilities north of Bellaire Boulevard. During this time, the southbound left turn queue overflows the left turn bay (**Figure 8**). The increased volume in the left turn bay reduces the effectiveness of the through lanes. The

westbound, eastbound, and northbound approaches function properly, as queues clear the intersection during each cycle. The signal system is coordinated so that Bellaire Boulevard vehicles approaching from Dairy Ashford Road to the west and South Kirkwood Road to the east are able to clear the intersection without stopping. No significant operational issues are apparent during the PM peak period.

Figure 8. Southbound Left-Turn Queue for Cook Road at Bellaire Boulevard

- *South Kirkwood Road* – Traffic traveling westbound during the PM peak hour experiences moderate delays at South Kirkwood Road (**Figure 9**). The left turn queue extends beyond the left turn bay, blocking traffic in the through lanes and reducing westbound through capacity. This restricts the ability of vehicles to enter and exit the commercial parking lot south of Bellaire Boulevard.

Figure 9. Westbound Queues at South Kirkwood Road

- *Belle Park Drive* – Belle Park Drive does not experience significant operational issues during the AM or PM peak periods.

- *Bellaire Boulevard between Belle Park Drive and Boone Road* - The first three median openings west of Boone Road do not provide left turn bays for eastbound traffic. This leaves left turning vehicles blocking the through lanes while waiting to turn left. Also, multiple vehicles enter the median opening while other vehicles already occupy the area, further increasing congestion (**Figure 10**).

Figure 10. Westbound Bellaire Boulevard, West of Boone Road

- *Wilcrest Drive* – Wilcrest Drive restricts left turn movements for the eastbound approach from 4 p.m. to 7 p.m. and the westbound approach from 6 a.m. to 9 a.m. Both approaches exempt buses from this restriction. During the PM peak period the eastbound approach still experiences vehicles in the left turn bay. Since the green phase is not actuated during these times, vehicles in these left turn bays are required to change lanes near the intersection, or to run the red light. Vehicles wanting to travel north on Boone Road must first travel through the intersection and then make a u-turn at one of the median openings located east of the intersection. The first median opening is only 330 feet away from the intersection. The close proximity to the intersection and lack of a left turn bay causes the left lane on Wilcrest to be blocked when multiple vehicles are attempting this maneuver..

- *Turtlewood Drive* – Turtlewood Drive does not experience significant operational issues during the AM or PM peak periods.

5.0 Proposed Improvement Recommendations

The following recommendations for the improvement of traffic operations along the Bellaire Boulevard corridor were considered. The intersection and the improvements recommended are listed below.

Wilcrest Drive at Bellaire Boulevard

- Add a right turn storage bay for westbound traffic - The designated right turn bay will allow the three through lanes to use the green time effectively and prevent through traffic volumes from being delayed by vehicles turning right. This recommendation will require additional pavement and striping on Bellaire Boulevard.
- Close the first median opening east of the intersection - The closed median will prevent left turn movements from interrupting the functionality of the green time for westbound traffic. Drivers heading eastbound will still be able to access the commercial center via the left turn bay at the next median opening to the east. This improvement will also allow for the extension of the westbound left turn storage bay at the intersection.
- Extend the northbound and southbound left turn storage bays – Currently, traffic overflows the storage bays causing delays to the through lanes. The additional storage

space will help reduce this overflow. Additional pavement and striping is required for this improvement.

- Widening to six lanes north of Bellaire Boulevard - Wilcrest Road will become a six lane road north of Bellaire Boulevard. The additional lane heading southbound would terminate as an additional left turn lane at Bellaire Boulevard. It should be noted that this improvement is listed in the H-GAC Regional Transportation Plan (RTP) as a short-term improvement (2015 let date, MPO ID 165). However, a schedule as not been set as to when this improvement will be implemented.

Figure 11 details the proposed layout of the intersection. Required additional pavement is shown in a darker shade of grey.

Figure 11: Bellaire Boulevard at Wilcrest Drive Proposed Intersection Layout

Boone Road at Bellaire Boulevard

- Add an additional left turn storage bay for westbound traffic - During the PM peak hour, traffic routinely overflows the storage bay and blocks through traffic. The additional left turn lane will help prevent vehicles from blocking the through lanes and increase the effectiveness of the green time allowed for the through traffic. Relocation of a signal mast arm, additional pavement, and new striping is required for this improvement.
- Extend the southbound left turn storage bay –The southbound left turn volume during the PM peak hour overwhelms the left turn storage bay causing delays to the through lanes.

Additional pavement on both sides of the roadway, along with striping modifications, is required for this improvement.

- Add a left turn storage bay for the first median opening west of Boone Road - An eastbound turning bay is recommended for the first median opening west of Boone Road. Vehicles turning left routinely block through traffic at this location reducing capacity of the through lanes on Bellaire Boulevard. Additional pavement and striping is required for this improvement.

Figure 12 details the proposed layout of the intersection. Required additional pavement is shown in a darker shade of grey.

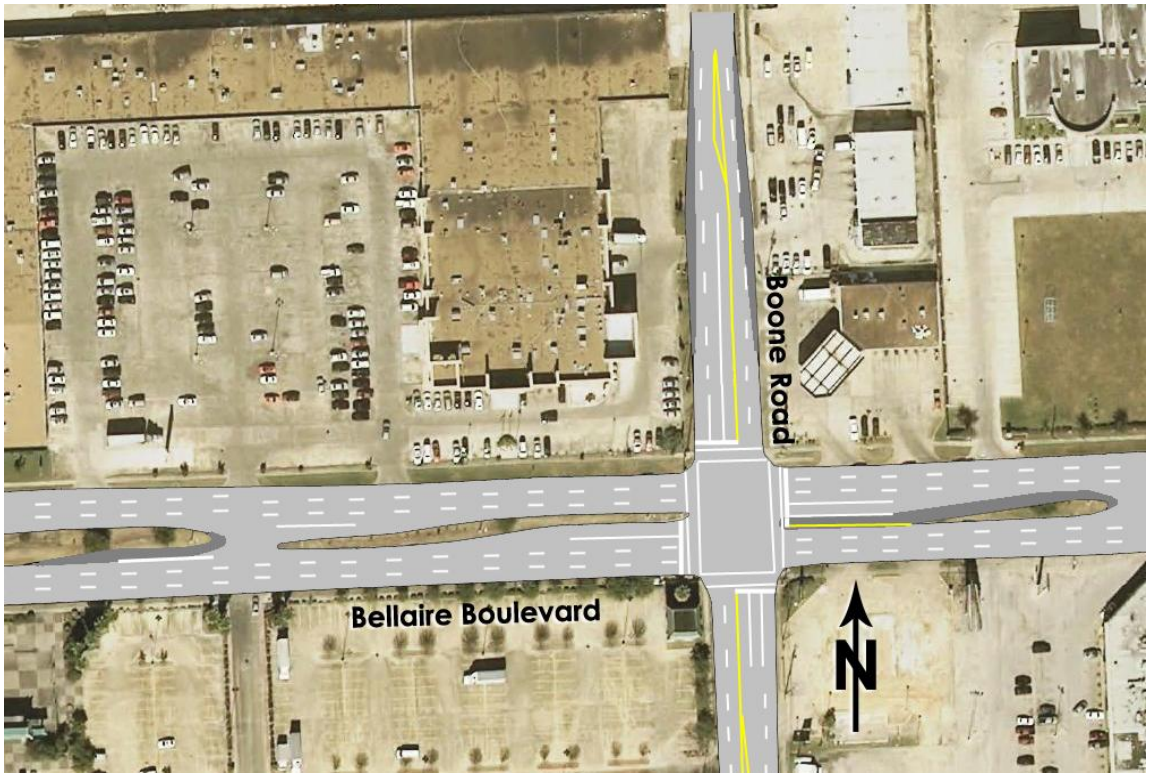


Figure 12: Bellaire Boulevard at Boone Road Proposed Intersection Layout

Belle Park Drive and Bellaire Boulevard

- Re-stripe the southbound approach at Belle Park Drive - This will provide a right-turn only lane plus a shared through left turn lane. This improvement will reduce the delays for the vehicles traveling southbound on Belle Park Drive and allow for more right turns on red. Additional striping is required for this improvement

Figure 13 details the proposed layout of the intersection. Required additional pavement is shown in a darker shade of grey.

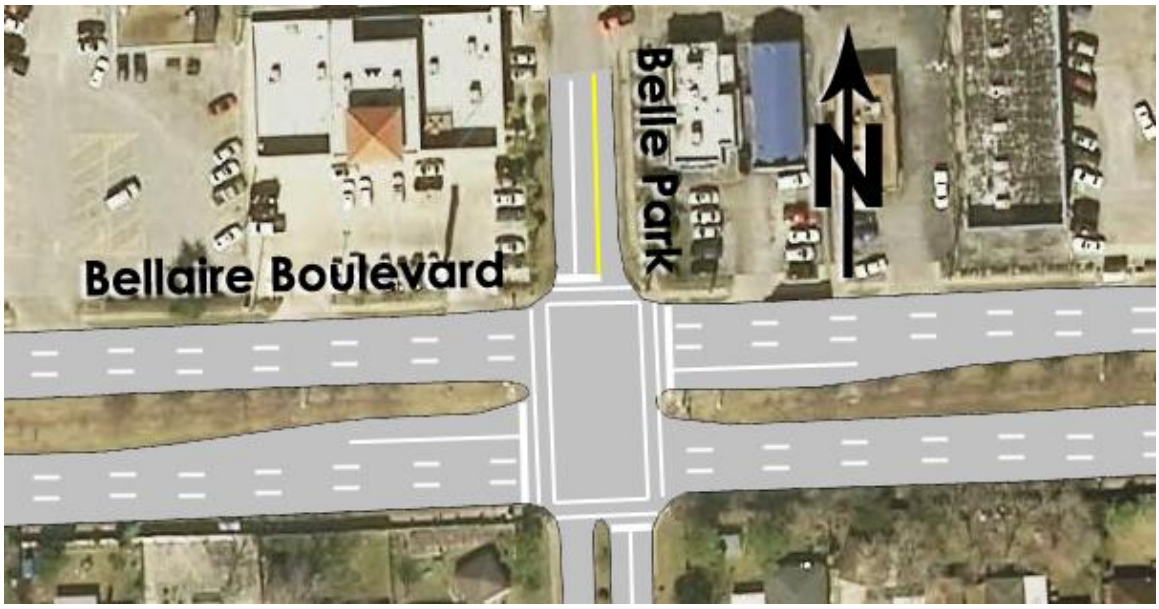


Figure 13: Bellaire Boulevard at Belle Park Drive Proposed Intersection Layout

South Kirkwood Road and Bellaire Boulevard

- Left turn bay for the first median opening west of South Kirkwood Road - Traffic turning into the park located to the south of Bellaire Boulevard routinely blocks through traffic, reducing capacity on Bellaire Boulevard. A left turn bay at this median opening would help prevent turning traffic from blocking the through lanes on Bellaire Boulevard. Additional pavement and striping is required for this improvement

Figure 14 details the proposed layout of the intersection. Required additional pavement is shown in a darker shade of grey.

Figure 14: Bellaire Boulevard at S. Kirkwood Road Proposed Intersection Layout

Cook Road and Bellaire Boulevard

- Extend the southbound left turn storage bay on Cook Road - This will provide more vehicle storage space. During the morning school drop-off periods, there is spillover into the through lanes, blocking the through traffic. Extending the left turn storage bay would help prevent turning traffic from blocking the through lanes on Cook Road. This recommendation will require additional pavement and striping modifications.

Figure 15 details the proposed layout of the intersection. Required additional pavement is shown in a darker shade of grey.

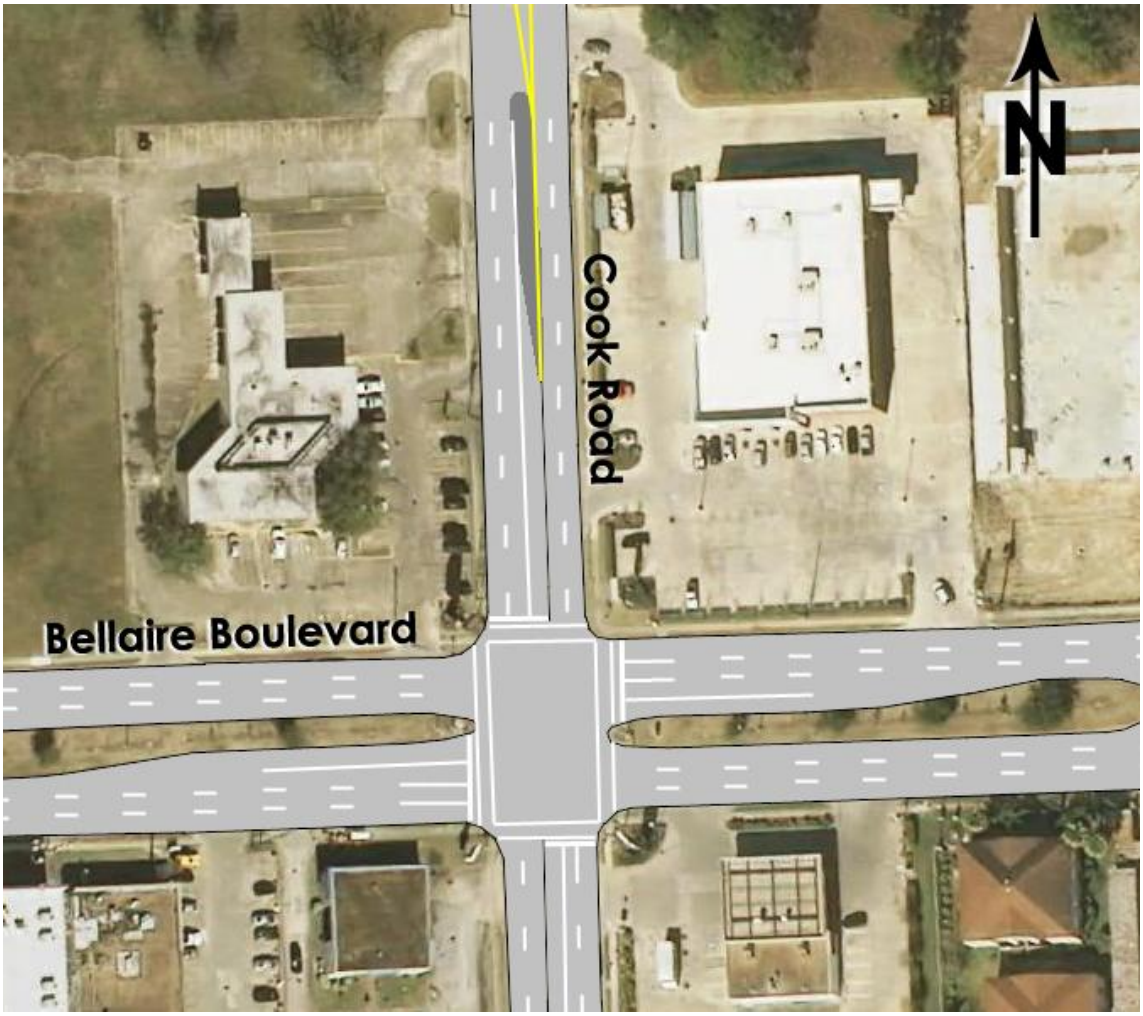


Figure 15: Bellaire Boulevard at Cook Road Proposed Intersection Layout

6.0 Intersection Level of Service Analysis

An intersection level of service (LOS) analysis provides a measure of delay and quality of service conditions for all approaches of an intersection. The HCM uses LOS as a qualitative measure to describe the operating conditions at signalized and unsignalized intersections in terms of the delay that the average driver experiences due to the presence of the intersection. The LOS ranges from A through F which represents driving conditions from best to worst respectively. LOS A represents free-flow conditions with no congestion, and LOS F represents severe congestion with significant delays. **Table 1** presents the LOS thresholds for signalized intersections per the 2000 edition of the HCM.

Table 1. LOS Thresholds for Signalized Intersections

LOS	Control Delay (s/veh)
A	≤ 10
B	> 10 and ≤ 20
C	> 20 and ≤ 35
D	> 35 and ≤ 55
E	> 55 and ≤ 80
F	> 80

An intersection LOS analysis was performed for the Bellaire Boulevard corridor in order to determine and compare the operational impacts of each potential improvement or combinations of improvements. The analysis was performed using Synchro 7.0, which is based on the 2000 Edition of the *Highway Capacity Manual*.

As part of the operational analysis, the existing signal timings along the Bellaire Boulevard corridor were obtained from the City of Houston in order to model the true existing conditions. In order to determine the immediate impact of the proposed improvements, the 2009 AM and PM peak hour volumes were modeled on the existing and proposed geometry (detailed above). Signal timings for the proposed conditions were optimized to reflect the new geometry. The results of the LOS analysis for the 2009 existing and proposed conditions are shown below in **Tables 2** and **3**.

Table 2: LOS Results for 2009 AM Peak Hour Existing and Proposed Conditions

Intersection	Existing		Proposed	
	Delay (s/veh)	HCM LOS	Delay (s/veh)	HCM LOS
Bellaire Blvd. at Cook Rd.	40.8	D	40.1	D
Bellaire Blvd. at S. Kirkwood Rd.	27.1	C	25.8	C
Bellaire Blvd. at Belle Park Dr.	9.2	A	9.2	A
Bellaire Blvd. at Boone Rd.	25.9	C	21.8	C
Bellaire Blvd. at Wilcrest Dr.	33.3	C	30.0	C
Bellaire Blvd. at Turtlewood Dr.	38.3	D	35.9	D

Table 3: LOS Results for 2009 PM Peak Hour Existing and Proposed Conditions

Intersection	Existing		Proposed	
	Delay (s/veh)	HCM LOS	Delay (s/veh)	HCM LOS
Bellaire Blvd. at Cook Rd.	30.8	C	30.9	C
Bellaire Blvd. at S. Kirkwood Rd.	28.8	C	36.1	D
Bellaire Blvd. at Belle Park Dr.	14.6	B	19.2	B
Bellaire Blvd. at Boone Rd.	60.7	E	39.6	D
Bellaire Blvd. at Wilcrest Dr.	61.8	E	40.8	D
Bellaire Blvd. at Turtlewood Dr.	11.0	B	11.3	B

The LOS analysis results show that the proposed improvements will reduce the vehicular delay at the intersections of Bellaire Boulevard with Boone Road and Wilcrest Drive during the PM peak hour, improving the LOS from E to D. Consequently, the increase in throughput through the two intersections increases the delay on Bellaire Boulevard at intersections to the west (Belle Park Drive, South Kirkwood Road, and Cook Road). These improvements also slightly reduced delay during the AM peak hour by allowing more green time to be allocated to critical movements.

In order to determine if the proposed improvements maintain their effectiveness over time, 2019 traffic volumes were modeled on the existing (no build condition) and proposed geometry for the AM and PM peak hours (**Tables 4** and **5**). During the AM peak hour, large delays are seen at the Bellaire Boulevard and Turtlewood Drive intersection due to traffic from Owens Intermediate School. Turtlewood Drive provides the only access to this campus.

During the PM peak hour, the proposed storage bays reduce the delay for Wilcrest Drive and Boone Road in the 2019 conditions; however, LOS E and F are still maintained. Westbound through demand during the PM peak hour in the vicinity of Boone Road and Wilcrest Drive exceeds capacity. Longer green time could be allotted to this movement; however, this solution would cause excessive side street delays while only marginally improving westbound operations. Therefore, the construction of a fourth westbound through lane for approximately one mile between Turtlewood Drive and Belle Park Road, using a portion of the existing median, is proposed for further consideration. This would require the removal of the second westbound left turn lane at Boone Road. The results of the LOS analysis of this option are also shown in **Tables 4** and **5** for comparison purposes.

Table 4: LOS Results for 2019 AM Peak Hour No Build and Build Conditions

Intersection	No Build		Proposed Storage Bays		Proposed Storage Bays with Additional WB Lane	
	Delay (s/veh)	HCM LOS	Delay (s/veh)	HCM LOS	Delay (s/veh)	HCM LOS
Bellaire Blvd. at Cook Rd.	55.1	E	54.8	D	54.6	D
Bellaire Blvd. at S. Kirkwood Rd.	29.2	C	28.8	C	27.9	C
Bellaire Blvd. at Belle Park Dr.	10.5	B	9.5	A	9.6	A
Bellaire Blvd. at Boone Rd.	76.3	E	29.3	D	33.9	C
Bellaire Blvd. at Wilcrest Dr.	33.8	C	30.3	C	29.7	C
Bellaire Blvd. at Turtlewood Dr.	94.0	F	91.4	F	72.1	E

Table 5: LOS Results for 2019 PM Peak Hour No Build and Build Conditions

Intersection	No Build		Proposed Storage Bays		Proposed Storage Bays with Additional WB Lane	
	Delay (s/veh)	HCM LOS	Delay (s/veh)	HCM LOS	Delay (s/veh)	HCM LOS
Bellaire Blvd. at Cook Rd.	40.7	D	40.0	D	40.1	D
Bellaire Blvd. at S. Kirkwood Rd.	37.5	D	47.2	D	47.8	D
Bellaire Blvd. at Belle Park Dr.	62.6	E	22.5	C	22.9	C
Bellaire Blvd. at Boone Rd.	105.7	F	81.2	F	52.9	D
Bellaire Blvd. at Wilcrest Dr.	90.6	F	65.2	E	48.3	D
Bellaire Blvd. at Turtlewood Dr.	15.2	B	16.4	B	13.3	B

The results of the analysis show that the proposed westbound lane improves LOS from F to D at the Bellaire Boulevard at Boone Road intersection and improves LOS from E to D at the Bellaire Boulevard at Wilcrest Drive intersection.

Detailed Synchro 7.0 results are located in **Appendix B**.

7.0 Probable Cost of Construction

Probable cost of construction estimates were developed for the investigated improvements based on general linear-foot unit costs. The estimated costs, in thousands of US dollars, are shown below in **Table 6**.

Table 6: Probable Cost of Construction of Alternatives

Intersection	Improvement	Cost Estimate ($US)
Bellaire Blvd at Boone Rd	Westbound Left Turn Lane	$397,000
Bellaire Blvd at Boone Rd	Southbound Left Turn Lane Extension	$57,700
West of Bellaire Blvd at Boone Rd	Eastbound Left Turn Lane at Median Opening	$41,000
Bellaire Blvd at Cook Rd	Southbound Left Turn Lane Extension	$49,600
West of Bellaire Blvd at S Kirkwood Rd	Westbound Left Turn Lane at Median Opening	$50,400
Bellaire Blvd at Wilcrest Dr	Westbound Right Turn Lane	$121,900
Bellaire Blvd at Wilcrest Dr	Southbound Left Turn Lane Extension	$37,300
Bellaire Boulevard at Wilcrest Dr	Northbound Left Turn Lane Extension	$41,500
Bellaire Boulevard at Wilcrest Dr	Westbound Left Turn Lane Extension	$54,400
Bellaire Boulevard (From Belle Park Rd. to Turtlewood Dr.)	Fourth Westbound Lane	$1,341,100

*Note: Right of way costs are not included in the probable cost of construction.

The detailed cost estimates are available in **Appendix C**.

8.0 Recommendations

The purpose of this study was to perform intersection LOS analyses to determine the potential benefits of various alternatives for improvement along the Bellaire Boulevard corridor in Houston, Texas. The results of the analysis show that additional left-turn and right-turn storage bays at the intersections of Wilcrest Drive and Boone Road provide operational benefits along Bellaire Boulevard. Also, the addition of a fourth westbound through lane from Turtlewood Drive to Belle Park drive provides operational benefits for the year 2019.

Given the results of the LOS analysis, it is recommended that the proposed turning bays be constructed. This will provide adequate short-term improvement for traffic flow through the study area.

To prevent conflicts in the proposed right turn bay at Wilcrest Drive, it is recommended to close the median opening immediately east of the intersection. This will prevent drivers from blocking through traffic in the eastbound and westbound directions while making a left turn. Drivers heading eastbound will still be able to access the commercial center via the left turn bay at the next median opening to the east.

Adding westbound thru capacity on Bellaire Boulevard does not appear to be necessary in the near future. However, additional westbound capacity will likely be necessary by 2019 as the projected volumes cause large delays along Bellaire Boulevard. The additional lane should extend from just east of Turtlewood Drive and terminate as a right-turn only lane at Belle Park Drive, covering a distance of approximately one mile. This proposed improvement is not listed in the H-GAC Transportation Improvement Plan (TIP) nor is it listed a short-term improvement in the RTP. The RTP lists smart street improvements for Bellaire Boulevard as a long-term project with a let date of 2023 (MPO ID 12237).

Appendix A

Intersection Turning Movement Count Data

Growth Rate Calculations

Intersection: Bellaire Blvd at Cook Road
Date: 10/8/2009
Weather Conditions: Good , Cloudy/Sunny

Street Name	Cook Road--Southbound				Bellaire Blvd--Westbound				Cook Road--Northbound				Bellaire Blvd-Eastbound			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
8:00 AM	46	197	114	0	123	840	158	0	171	347	73	0	95	1989	202	0
5:00 PM	95	362	88	0	83	1900	192	0	133	248	130	0	135	1019	63	0

Street Name	Cook Road--Southbound				Bellaire Blvd--Westbound				Cook Road--Northbound				Bellaire Blvd-Eastbound			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
6:00 AM	9	24	11	0	14	40	0	1	8	23	4	0	11	189	11	0
6:15 AM	21	43	17	0	85	66	2	23	9	39	14	0	6	257	15	0
6:30 AM	34	60	54	0	90	210	11	0	10	56	13	0	8	277	21	0
6:45 AM	52	123	87	0	92	235	18	5	23	79	17	0	19	374	38	0
Total	**116**	**250**	**169**	**0**	**281**	**551**	**31**	**29**	**50**	**197**	**48**	**0**	**44**	**1097**	**85**	**0**
7:00 AM	64	87	63	0	53	212	26	0	17	58	21	0	10	406	30	0
7:15 AM	23	70	29	0	27	186	52	0	30	86	13	0	17	443	50	0
7:30 AM	9	107	44	0	83	170	25	9	37	83	10	0	16	457	42	0
7:45 AM	7	138	48	0	45	184	33	0	39	87	12	0	17	502	53	0
Total	**103**	**402**	**184**	**0**	**208**	**752**	**136**	**9**	**123**	**314**	**56**	**0**	**60**	**1808**	**175**	**0**
8:00 AM	20	86	33	0	53	219	53	0	38	89	20	0	26	476	53	0
8:15 AM	11	50	35	0	33	215	30	0	42	81	17	0	30	491	54	0
8:30 AM	10	28	17	0	19	227	40	0	57	101	18	0	26	500	40	0
8:45 AM	5	33	29	0	18	179	35	0	34	76	18	0	13	522	55	0
Total	**46**	**197**	**114**	**0**	**123**	**840**	**158**	**0**	**171**	**347**	**73**	**0**	**95**	**1989**	**202**	**0**

Street Name	Cook Road--Southbound				Bellaire Blvd--Westbound				Cook Road--Northbound				Bellaire Blvd-Eastbound			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
4:00 PM	12	59	3	0	11	335	32	0	30	51	33	0	36	178	9	0
4:15 PM	11	225	103	0	17	603	47	0	55	83	61	0	42	301	18	0
4:30 PM	9	197	67	0	61	653	71	0	44	70	46	1	40	322	21	1
4:45 PM	7	143	70	0	40	534	76	0	30	79	40	0	28	271	22	0
Total	**39**	**624**	**243**	**0**	**129**	**2125**	**226**	**0**	**159**	**283**	**180**	**1**	**146**	**1072**	**70**	**1**
5:00 PM	20	73	23	0	15	451	40	0	34	51	28	0	36	279	26	0
5:15 PM	27	97	17	0	25	478	51	0	45	65	31	0	29	236	12	0
5:30 PM	23	89	23	0	24	497	57	0	22	56	34	0	41	251	18	0
5:45 PM	25	103	25	0	19	474	44	0	32	76	37	0	29	253	7	0
Total	95	362	88	0	83	1900	192	0	133	248	130	0	135	1019	63	0

Time Period	Cook Road--Southbound	Bellaire Blvd--Westbound	Cook Road--Northbound	Bellaire Blvd-Eastbound
Peak Hour Factor (AM)	0.64	0.86	0.84	0.97
Peak Hour Factor (PM)	0.89	0.94	0.88	0.89

Intersection: Bellaire Blvd at Kirkwood Rd
Date Counted: 10/20/2009
Weather Conditions: Good , Cloudy/Sunny

Street Name	Kirkwood Rd--Southbound				Bellaire Blvd--Westbound				Kirkwood Rd--Northbound				Bellaire Blvd-Eastbound			
Start Time	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**
8:00 AM	**29**	**196**	**112**	**0**	**75**	**803**	**95**	**0**	**111**	**309**	**87**	**0**	**39**	**1524**	**58**	**0**
5:00 PM	**19**	**401**	**126**	**0**	**41**	**1707**	**202**	**0**	**24**	**364**	**165**	**0**	**43**	**930**	**69**	**0**

Street Name	Kirkwood Rd--Southbound				Bellaire Blvd--Westbound				Kirkwood Rd--Northbound				Bellaire Blvd-Eastbound			
Start Time	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**
6:00 AM	6	13	9	0	8	83	7	0	10	31	14	0	5	113	3	0
6:15 AM	14	25	16	0	17	153	11	0	19	69	17	0	13	178	2	0
6:30 AM	7	25	15	0	14	174	20	4	29	57	23	0	2	268	4	0
6:45 AM	9	41	25	0	13	224	23	0	25	83	46	0	3	303	11	0
Total	**36**	**104**	**65**	**0**	**52**	**634**	**61**	**4**	**83**	**240**	**100**	**0**	**23**	**862**	**20**	**0**
7:00 AM	4	59	34	0	4	232	13	0	25	102	43	0	1	409	11	0
7:15 AM	3	66	32	0	11	182	22	0	18	77	28	0	10	427	11	0
7:30 AM	4	49	18	0	10	164	20	0	24	58	26	0	1	398	8	0
7:45 AM	6	57	39	0	9	178	25	0	22	89	27	0	2	419	20	0
Total	**17**	**231**	**123**	**0**	**34**	**756**	**80**	**0**	**89**	**326**	**124**	**0**	**14**	**1653**	**50**	**0**
8:00 AM	5	63	23	0	10	188	23	0	17	78	25	0	2	408	15	0
8:15 AM	2	54	36	0	19	211	20	0	14	89	17	0	1	430	13	0
8:30 AM	11	49	23	0	27	225	30	0	49	79	24	0	16	376	11	0
8:45 AM	11	30	30	0	19	179	22	0	31	63	21	0	20	310	19	0
Total	**29**	**196**	**112**	**0**	**75**	**803**	**95**	**0**	**111**	**309**	**87**	**0**	**39**	**1524**	**58**	**0**

Street Name	Kirkwood Rd--Southbound				Bellaire Blvd--Westbound				Kirkwood Rd--Northbound				Bellaire Blvd-Eastbound			
Start Time	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**
4:00 PM	3	85	29	0	8	391	49	0	9	87	36	0	26	253	20	0
4:15 PM	2	80	27	0	9	405	55	0	7	100	41	0	24	264	16	0
4:30 PM	6	97	29	0	17	429	46	0	3	80	26	0	8	245	20	0
4:45 PM	0	88	27	0	4	390	31	0	0	66	45	0	3	279	23	1
Total	**11**	**350**	**112**	**0**	**38**	**1615**	**181**	**0**	**19**	**333**	**148**	**0**	**61**	**1041**	**79**	**1**
5:00 PM	1	97	27	0	4	447	51	0	5	77	33	0	9	298	24	0
5:15 PM	11	108	33	0	14	419	59	0	5	102	52	0	22	249	14	0
5:30 PM	6	100	31	0	16	469	50	0	10	87	42	0	6	207	18	0
5:45 PM	1	96	35	0	7	372	42	0	4	98	38	0	6	176	13	0
Total	**19**	**401**	**126**	**0**	**41**	**1707**	**202**	**0**	**24**	**364**	**165**	**0**	**43**	**930**	**69**	**0**
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Time Period	Kirkwood Rd--Southbound	Bellaire Blvd--Westbound	Kirkwood Rd--Northbound	Bellaire Blvd-Eastbound
Peak Hour Factor (AM)	0.92	0.86	0.83	0.91
Peak Hour Factor (PM)	0.90	0.91	0.87	0.79

Intersection: Bellaire Blvd at Belle Park Dr.
Date Counted: 10/1/2009
Weather Conditions: Good , Cloudy/Sunny

Street Name	Belle Park Dr.-Southbound				Bellaire Blvd -Westbound				Belle Park Dr-Northbound				Bellaire Blvd-Eastbound			
Start Time	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**
8:00 AM	**50**	**5**	**51**	**0**	**34**	**877**	**44**	**0**	**25**	**18**	**29**	**0**	**1**	**1692**	**90**	**0**
5:00 PM	84	31	72	0	43	2365	27	0	10	13	51	0	13	1162	44	0

Street Name	Belle Park Dr.-Southbound				Bellaire Blvd -Westbound				Belle Park Dr-Northbound				Bellaire Blvd-Eastbound			
Start Time	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**
6:00 AM	2	0	5	0	1	62	1	0	2	0	1	0	1	168	4	0
6:15 AM	4	0	3	0	10	83	0	0	10	0	3	0	1	230	19	0
6:30 AM	7	1	12	0	0	207	2	0	10	0	11	0	0	361	8	0
6:45 AM	21	2	11	0	3	217	4	0	7	5	14	0	1	425	13	0
Total	**34**	**3**	**31**	**0**	**14**	**569**	**7**	**0**	**29**	**5**	**29**	**0**	**3**	**1184**	**44**	**0**
7:00 AM	6	1	11	0	4	257	1	0	6	2	15	0	0	513	17	0
7:15 AM	5	3	9	0	3	203	7	0	14	7	5	0	0	555	12	0
7:30 AM	8	1	4	0	17	198	7	0	12	3	7	0	1	513	11	0
7:45 AM	10	1	19	0	11	208	7	0	9	4	3	0	10	443	20	0
Total	**29**	**6**	**43**	**0**	**35**	**866**	**22**	**0**	**41**	**16**	**30**	**0**	**11**	**2024**	**60**	**0**
8:00 AM	10	1	19	0	14	217	12	0	5	2	7	0	1	415	35	0
8:15 AM	10	3	15	0	6	230	13	0	8	8	11	0	0	357	24	0
8:30 AM	22	0	7	0	7	230	11	0	8	5	5	0	0	542	20	0
8:45 AM	8	1	10	0	7	200	8	0	4	3	6	0	0	378	11	0
Total	**50**	**5**	**51**	**0**	**34**	**877**	**44**	**0**	**25**	**18**	**29**	**0**	**1**	**1692**	**90**	**0**

Street Name	Belle Park Dr.-Southbound				Bellaire Blvd -Westbound				Belle Park Dr-Northbound				Bellaire Blvd-Eastbound			
Start Time	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**
4:00 PM	14	5	15	0	8	421	19	0	2	4	5	0	1	281	17	0
4:15 PM	19	3	22	0	5	439	8	0	4	2	7	0	0	318	26	0
4:30 PM	18	8	15	0	8	424	5	0	1	2	8	0	0	215	16	0
4:45 PM	28	6	27	0	11	481	12	0	2	3	4	0	3	335	11	0
Total	**79**	**22**	**79**	**0**	**32**	**1765**	**44**	**0**	**9**	**11**	**24**	**0**	**4**	**1149**	**70**	**0**
5:00 PM	14	5	24	0	11	460	10	0	1	3	7	0	2	319	9	0
5:15 PM	21	11	22	0	7	515	6	0	2	1	8	0	5	237	14	0
5:30 PM	28	7	12	0	18	652	3	0	2	3	14	0	3	299	8	0
5:45 PM	21	8	14	0	7	738	8	0	5	6	22	0	3	307	13	0
Total	**84**	**31**	**72**	**0**	**43**	**2365**	**27**	**0**	**10**	**13**	**51**	**0**	**13**	**1162**	**44**	**0**

Time Period	Belle Park Dr.-Southbound	Bellaire Blvd -Westbound	Belle Park Dr-Northbound	Bellaire Blvd-Eastbound
Peak Hour Factor (AM)	0.88	0.96	0.67	0.79
Peak Hour Factor (PM)	0.87	0.81	0.56	0.92

Intersection: Bellaire Blvd. at Boone
Date Counted: 10/20/2009
Weather Conditions: Good , Sunny

Street Name	Boone--Southbound				Bellaire Blvd--Westbound				Boone--Northbound				Bellaire Blvd--Eastbound			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
8:00 AM	56	155	91	0	27	831	120	0	206	149	159	0	137	2001	39	0
5:00 PM	91	211	78	0	76	2462	259	0	131	223	178	0	152	1054	107	1

Street Name	Boone--Southbound				Bellaire Blvd--Westbound				Boone--Northbound				Bellaire Blvd--Eastbound			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
6:00 AM	4	9	7	0	2	57	7	0	10	5	9	0	18	189	3	1
6:15 AM	5	14	19	0	5	88	3	0	8	6	5	0	5	198	2	0
6:30 AM	7	20	17	0	7	147	12	0	16	14	17	0	18	242	6	1
6:45 AM	18	25	19	0	3	175	17	0	24	19	39	0	13	336	6	0
Total	**34**	**68**	**62**	**0**	**17**	**467**	**39**	**0**	**58**	**44**	**70**	**0**	**54**	**965**	**17**	**2**
7:00 AM	27	44	10	0	3	168	5	0	44	16	42	0	57	333	7	4
7:15 AM	10	39	27	0	9	165	15	0	39	30	57	0	40	428	16	0
7:30 AM	14	38	32	0	13	198	21	0	45	23	29	1	32	544	13	0
7:45 AM	25	52	33	0	6	198	33	0	77	37	33	0	21	506	15	0
Total	**76**	**173**	**102**	**0**	**31**	**729**	**74**	**0**	**205**	**106**	**161**	**1**	**150**	**1811**	**51**	**4**
8:00 AM	18	47	18	0	6	222	34	0	48	41	28	0	44	576	4	0
8:15 AM	13	35	22	0	9	187	26	0	55	44	41	0	26	468	13	0
8:30 AM	14	33	26	0	6	233	25	0	55	27	32	0	31	528	15	0
8:45 AM	11	40	25	0	6	189	35	0	48	37	58	0	36	429	7	0
Total	**56**	**155**	**91**	**0**	**27**	**831**	**120**	**0**	**206**	**149**	**159**	**0**	**137**	**2001**	**39**	**0**

Street Name	Boone--Southbound				Bellaire Blvd--Westbound				Boone--Northbound				Bellaire Blvd--Eastbound			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
4:00 PM	12	25	13	0	7	268	39	0	8	9	15	0	11	104	3	0
4:15 PM	19	24	17	0	13	478	72	0	35	63	64	0	22	296	16	0
4:30 PM	28	45	14	0	16	430	78	0	29	52	55	0	50	330	16	0
4:45 PM	27	40	15	0	17	488	75	0	29	54	48	0	34	273	23	0
Total	**86**	**134**	**59**	**0**	**53**	**1664**	**264**	**0**	**101**	**178**	**182**	**0**	**117**	**1003**	**58**	**0**
5:00 PM	23	54	27	0	14	520	53	0	21	28	30	0	51	184	20	1
5:15 PM	18	50	16	0	16	582	70	0	47	56	55	0	44	247	37	0
5:30 PM	32	48	16	0	19	642	58	0	32	82	55	0	22	347	29	0
5:45 PM	18	59	19	0	27	718	78	0	31	57	38	0	35	276	21	0
Total	**91**	**211**	**78**	**0**	**76**	**2462**	**259**	**0**	**131**	**223**	**178**	**0**	**152**	**1054**	**107**	**1**

Time Period	Boone--Southbound	Bellaire Blvd--Westbound	Boone--Northbound	Bellaire Blvd--Eastbound
Peak Hour Factor (AM)	0.91	0.93	0.90	0.87
Peak Hour Factor (PM)	0.91	0.85	0.79	0.82

Intersection: Bellaire Blvd. at Willcrest Dr.
Date Counted: 10/6/2009
Weather Conditions: Good , Cloudy/Sunny

Street Name	Willcrest Dr.-Southbound				Bellaire Blvd--Westbound				Willcrest Dr.--Northbound				Bellaire Blvd--Eastbound			
Start Time	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**
8:00 AM	77	387	272	0	69	1115	20	0	171	347	73	0	95	1989	202	0
5:00 PM	127	658	188	0	281	2357	179	0	99	527	99	0	86	1241	0	0

Street Name	Willcrest Dr.-Southbound				Bellaire Blvd--Westbound				Willcrest Dr.--Northbound				Bellaire Blvd--Eastbound			
Start Time	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**
6:00 AM	1	32	21	0	5	73	16	0	8	23	4	0	11	186	11	0
6:15 AM	16	43	30	0	4	119	0	0	9	39	14	0	6	257	15	0
6:30 AM	19	101	50	0	11	180	4	0	10	56	13	0	8	277	21	0
6:45 AM	9	96	60	0	17	277	23	0	23	79	17	0	19	374	38	0
Total	**45**	**272**	**161**	**0**	**37**	**649**	**43**	**0**	**50**	**197**	**48**	**0**	**44**	**1094**	**85**	**0**
7:00 AM	9	50	12	0	11	115	11	0	17	58	21	0	10	406	30	0
7:15 AM	8	97	69	0	22	221	5	0	30	86	13	0	17	443	50	0
7:30 AM	30	80	91	0	20	211	1	0	37	83	10	0	16	457	42	0
7:45 AM	8	50	39	1	7	267	36	0	39	87	12	0	17	502	53	0
Total	**55**	**277**	**211**	**1**	**60**	**814**	**53**	**0**	**123**	**314**	**56**	**0**	**60**	**1808**	**175**	**0**
8:00 AM	18	96	91	0	20	259	0	0	38	89	20	0	26	476	53	0
8:15 AM	15	100	58	0	9	320	0	0	42	81	17	0	30	491	54	0
8:30 AM	26	103	58	0	15	262	0	0	57	101	18	0	26	500	40	0
8:45 AM	18	88	65	0	25	274	20	0	34	76	18	0	13	522	55	0
Total	**77**	**387**	**272**	**0**	**69**	**1115**	**20**	**0**	**171**	**347**	**73**	**0**	**95**	**1989**	**202**	**0**

Street Name	Willcrest Dr.-Southbound				Bellaire Blvd--Westbound				Willcrest Dr.--Northbound				Bellaire Blvd--Eastbound			
Start Time	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**	**Right**	**Thru**	**Left**	**Peds**
4:00 PM	29	80	30	0	21	360	31	0	26	97	24	0	15	300	24	0
4:15 PM	67	130	62	0	62	567	46	0	22	91	28	0	10	303	0	0
4:30 PM	50	176	77	0	67	796	78	0	25	127	33	0	14	304	0	0
4:45 PM	55	183	47	0	72	798	52	0	22	100	14	0	15	320	0	0
Total	**201**	**569**	**216**	**0**	**222**	**2521**	**207**	**0**	**95**	**415**	**99**	**0**	**54**	**1227**	**24**	**0**
5:00 PM	45	184	48	0	63	553	24	0	23	131	11	0	25	345	0	0
5:15 PM	30	139	34	0	58	573	56	0	27	128	31	0	19	304	0	0
5:30 PM	25	188	56	0	82	574	51	0	27	152	32	0	26	296	0	0
5:45 PM	27	147	50	0	78	657	48	0	22	116	25	0	16	296	0	0
Total	**127**	**658**	**188**	**0**	**281**	**2357**	**179**	**0**	**99**	**527**	**99**	**0**	**86**	**1241**	**0**	**0**

Time Period	Willcrest Dr.-Southbound	Bellaire Blvd--Westbound	Willcrest Dr.--Northbound	Bellaire Blvd--Eastbound
Peak Hour Factor (AM)	0.90	0.91	0.84	0.97
Peak Hour Factor (PM)	0.88	0.90	0.86	0.90

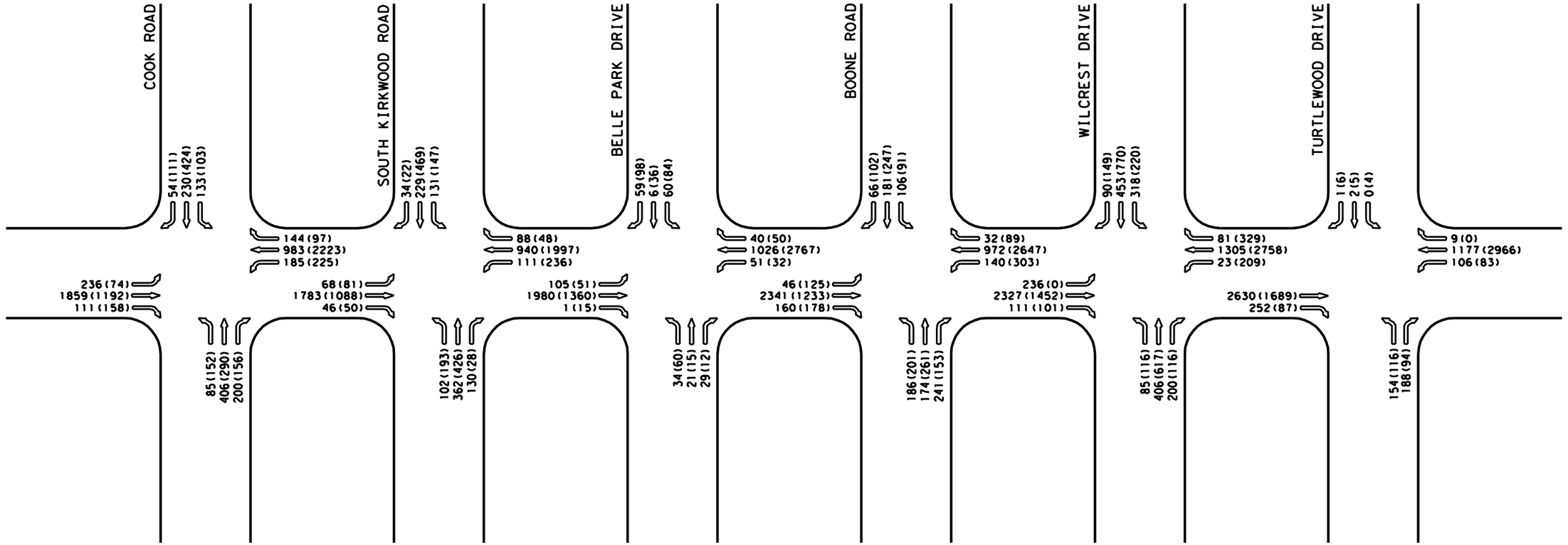
Intersection: Bellaire Blvd at Turtlewood Dr.
Date Counted: 10/1/2009
Weather Conditions: Good , Cloudy/Sunny

Street Name	Turtlewood Dr.-Southbound				Bellaire Blvd -Westbound				Turtlewood Dr.-Northbound				Bellaire Blvd-Eastbound			
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
8:00 AM	0	2	1	0	91	1006	8	0	132	0	161	0	0	2248	215	0
5:00 PM	3	4	5	0	71	2535	0	0	99	0	80	0	0	1444	74	0

Street Name	Turtlewood Dr.-Southbound				Bellaire Blvd -Westbound				Turtlewood Dr.-Northbound				Bellaire Blvd-Eastbound			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
6:00 AM	0	0	0	0	0	77	1	0	8	0	0	0	1	242	0	0
6:15 AM	0	0	0	0	0	100	1	0	12	0	3	0	6	285	0	0
6:30 AM	0	0	0	0	0	185	7	0	16	0	3	0	7	350	0	0
6:45 AM	0	0	0	0	0	231	17	0	10	0	3	0	4	569	0	0
Total	**0**	**0**	**0**	**0**	**0**	**593**	**26**	**0**	**46**	**0**	**9**	**0**	**18**	**1446**	**0**	**0**
7:00 AM	1	0	0	0	0	201	14	0	11	0	6	0	8	518	0	1
7:15 AM	0	0	0	0	0	159	10	0	19	0	9	0	16	554	0	0
7:30 AM	0	0	0	0	0	216	9	0	29	0	23	0	26	490	0	0
7:45 AM	0	1	0	0	0	284	21	0	28	0	16	0	30	534	0	0
Total	**1**	**1**	**0**	**0**	**0**	**860**	**54**	**0**	**87**	**0**	**54**	**0**	**80**	**2096**	**0**	**1**
8:00 AM	0	0	0	0	0	267	30	0	46	0	41	0	71	487	0	0
8:15 AM	1	2	0	0	0	236	22	0	36	0	46	0	96	392	0	0
8:30 AM	0	0	0	0	0	249	26	0	41	0	34	0	37	553	0	0
8:45 AM	0	0	0	0	8	254	13	0	38	0	11	0	11	816	0	0
Total	**1**	**2**	**0**	**0**	**8**	**1006**	**91**	**0**	**161**	**0**	**132**	**0**	**215**	**2248**	**0**	**0**

Street Name	Turtlewood Dr.-Southbound				Bellaire Blvd -Westbound				Turtlewood Dr.-Northbound				Bellaire Blvd-Eastbound			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
4:00 PM	0	0	0	0	0	519	26	0	36	0	61	0	31	418	1	0
4:15 PM	0	0	1	0	0	502	14	0	26	0	38	0	29	378	0	0
4:30 PM	0	1	1	0	0	526	20	0	42	0	36	0	24	320	0	0
4:45 PM	0	1	0	0	0	565	17	0	20	1	18	0	23	371	0	0
Total	**0**	**2**	**2**	**0**	**0**	**2112**	**77**	**0**	**124**	**1**	**153**	**0**	**107**	**1487**	**1**	**0**
5:00 PM	0	2	2	0	0	537	17	0	21	0	18	0	13	335	0	0
5:15 PM	0	0	0	0	0	661	19	0	20	0	22	0	24	405	0	0
5:30 PM	0	2	0	0	0	638	19	0	22	0	31	0	19	327	0	0
5:45 PM	5	0	1	0	0	699	16	0	17	0	28	0	18	377	0	0
Total	**5**	**4**	**3**	**0**	**0**	**2535**	**71**	**0**	**80**	**0**	**99**	**0**	**74**	**1444**	**0**	**0**

Time Period	Turtlewood Dr.-Southbound	Bellaire Blvd -Westbound	Turtlewood Dr.-Northbound	Bellaire Blvd-Eastbound
Peak Hour Factor (AM)	0.25	0.93	0.84	0.74
Peak Hour Factor (PM)	0.50	0.91	0.84	0.88



LEGEND:
AM PEAK HOUR VOLUME - 00
PM PEAK HOUR VOLUME - (00)

AECOM
5757 WOODWAY
SUITE 101 WEST
HOUSTON, TX 77057
WWW.AECOM.COM

PROPOSED VOLUMES FOR 2019

INTERNATIONAL MANAGEMENT DISTRICT
HOUSTON, TEXAS

NOVEMBER 2009

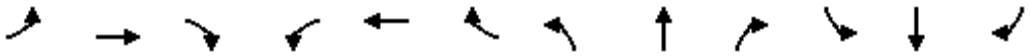
11/23/2009 7:31:33 AM
T:\International Management District\Bellaire Study\CADD\Proposed Volumes.dgn

Growth Rate Calculation

ADT Location	Volume		Growth Rate
	2006	2035	
West of Coook Rd.	40980	57161	1.15%
West of S. Kirkwood Road	45620	69703	1.85%
East of S. Kirkwood Road	46600	74676	1.64%
Average			**1.55%**

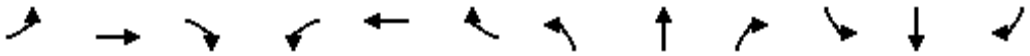
Appendix B

Intersection Level of Service Results



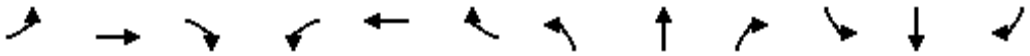
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2248	215	91	1006	8	132	0	161	0	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			5.9	4.0		4.0	
Lane Util. Factor		0.91		1.00	0.91			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.96	
Flt Protected		1.00		0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)		5019		1770	5079			1770	1583		1779	
Flt Permitted		1.00		0.95	1.00			0.76	1.00		1.00	
Satd. Flow (perm)		5019		1770	5079			1408	1583		1779	
Peak-hour factor, PHF	0.74	0.74	0.74	0.93	0.93	0.93	0.92	0.92	0.92	0.84	0.84	0.84
Adj. Flow (vph)	0	3038	291	98	1082	9	143	0	175	0	2	1
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	113	0	1	0
Lane Group Flow (vph)	0	3321	0	98	1091	0	0	143	62	0	2	0
Turn Type				Prot			Perm		Perm	Perm		
Protected Phases		2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)		77.4		9.2	91.9			16.9	16.9		16.9	
Effective Green, g (s)		78.7		10.5	93.2			16.9	18.8		18.8	
Actuated g/C Ratio		0.66		0.09	0.78			0.14	0.16		0.16	
Clearance Time (s)		5.3		5.3	5.3			5.9	5.9		5.9	
Vehicle Extension (s)		3.0		2.5	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)		3292		155	3945			198	248		279	
v/s Ratio Prot		c0.66		c0.06	0.21						0.00	
v/s Ratio Perm								c0.10	0.04			
v/c Ratio		1.01		0.63	0.28			0.72	0.25		0.01	
Uniform Delay, d1		20.6		52.9	3.8			49.3	44.4		42.7	
Progression Factor		1.54		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		15.8		7.2	0.2			11.5	0.4		0.0	
Delay (s)		47.5		60.0	4.0			60.8	44.8		42.7	
Level of Service		D		E	A			E	D		D	
Approach Delay (s)		47.5			8.6			52.0			42.7	
Approach LOS		D			A			D			D	

Intersection Summary			
HCM Average Control Delay	38.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



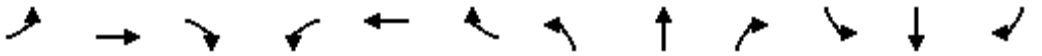
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	1989	95	0	1115	69	73	347	171	272	387	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91			0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99			0.99		1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5051			5041		1770	3364		1770	3451	
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5051			5041		1770	3364		1770	3451	
Peak-hour factor, PHF	0.97	0.97	0.97	0.91	0.91	0.91	0.84	0.84	0.84	0.90	0.90	0.90
Adj. Flow (vph)	208	2051	98	0	1225	76	87	413	204	302	430	86
RTOR Reduction (vph)	0	4	0	0	6	0	0	11	0	0	13	0
Lane Group Flow (vph)	208	2145	0	0	1295	0	87	606	0	302	503	0
Turn Type	Prot			Perm			Prot			Prot		
Protected Phases	5	2			6		3	8		7	4	
Permitted Phases				6								
Actuated Green, G (s)	19.1	58.6			34.0		10.5	26.1		18.8	34.4	
Effective Green, g (s)	20.6	60.1			35.5		12.0	27.6		20.3	35.9	
Actuated g/C Ratio	0.17	0.50			0.30		0.10	0.23		0.17	0.30	
Clearance Time (s)	5.5	5.5			5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	3.0			3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	304	2530			1491		177	774		299	1032	
v/s Ratio Prot	0.12	c0.42			0.26		0.05	c0.18		c0.17	0.15	
v/s Ratio Perm												
v/c Ratio	0.68	0.85			0.87		0.49	0.78		1.01	0.49	
Uniform Delay, d1	46.6	26.0			40.0		51.1	43.4		49.8	34.5	
Progression Factor	0.59	0.32			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	1.6			7.0		0.8	5.2		54.6	0.4	
Delay (s)	29.4	9.8			47.0		51.9	48.6		104.5	34.9	
Level of Service	C	A			D		D	D		F	C	
Approach Delay (s)		11.6			47.0			49.0			60.6	
Approach LOS		B			D			D			E	

Intersection Summary			
HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



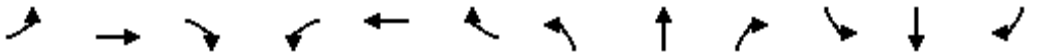
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	2001	137	120	831	27	159	149	206	91	155	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.91		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5037		1770	5061		1770	3231		1770	3397	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5037		1770	5061		1770	3231		1770	3397	
Peak-hour factor, PHF	0.87	0.87	0.87	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91
Adj. Flow (vph)	45	2300	157	129	894	29	177	166	229	100	170	62
RTOR Reduction (vph)	0	6	0	0	2	0	0	164	0	0	34	0
Lane Group Flow (vph)	45	2451	0	129	921	0	177	231	0	100	198	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	6.7	58.4		10.8	62.5		16.8	20.1		8.9	12.2	
Effective Green, g (s)	7.9	59.6		12.0	63.7		18.5	21.8		10.6	13.9	
Actuated g/C Ratio	0.07	0.50		0.10	0.53		0.15	0.18		0.09	0.12	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.7	5.7		5.7	5.7	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	117	2502		177	2687		273	587		156	393	
v/s Ratio Prot	0.03	c0.49		c0.07	0.18		c0.10	c0.07		c0.06	0.06	
v/s Ratio Perm												
v/c Ratio	0.38	0.98		0.73	0.34		0.65	0.39		0.64	0.50	
Uniform Delay, d1	53.7	29.6		52.4	16.1		47.7	43.3		52.9	49.8	
Progression Factor	1.28	0.40		0.41	0.25		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	12.7		7.7	0.2		4.6	0.4		7.7	1.0	
Delay (s)	70.0	24.6		29.3	4.2		52.3	43.7		60.6	50.8	
Level of Service	E	C		C	A		D	D		E	D	
Approach Delay (s)		25.4			7.2			46.4			53.8	
Approach LOS		C			A			D			D	

Intersection Summary			
HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



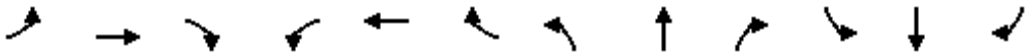
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	1692	1	44	877	34	29	18	25	51	5	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.98	
Satd. Flow (prot)	1770	5085		1770	5057			1807	1583		1703	
Flt Permitted	0.95	1.00		0.95	1.00			0.70	1.00		0.80	
Satd. Flow (perm)	1770	5085		1770	5057			1296	1583		1392	
Peak-hour factor, PHF	0.79	0.79	0.79	0.96	0.96	0.96	0.67	0.67	0.67	0.88	0.88	0.88
Adj. Flow (vph)	114	2142	1	46	914	35	43	27	37	58	6	57
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	32	0	31	0
Lane Group Flow (vph)	114	2143	0	46	947	0	0	70	5	0	90	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)	12.1	84.6		6.7	79.2			13.4	13.4		13.4	
Effective Green, g (s)	13.1	85.6		7.7	80.2			14.7	14.7		14.7	
Actuated g/C Ratio	0.11	0.71		0.06	0.67			0.12	0.12		0.12	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.3	5.3		5.3	
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)	193	3627		114	3380			159	194		171	
v/s Ratio Prot	c0.06	c0.42		0.03	0.19							
v/s Ratio Perm								0.05	0.00		c0.06	
v/c Ratio	0.59	0.59		0.40	0.28			0.44	0.02		0.53	
Uniform Delay, d1	50.9	8.5		53.9	8.1			48.8	46.3		49.4	
Progression Factor	1.26	0.28		1.10	0.45			1.00	1.00		1.00	
Incremental Delay, d2	2.6	0.6		0.8	0.2			1.4	0.0		2.2	
Delay (s)	66.6	3.0		60.4	3.9			50.3	46.4		51.6	
Level of Service	E	A		E	A			D	D		D	
Approach Delay (s)		6.2			6.5			48.9			51.6	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



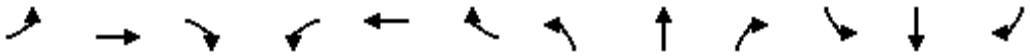
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	1524	39	95	803	75	87	309	111	112	196	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	0.99		1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5066		1770	5020		1770	3399		1770	3470	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5066		1770	5020		1770	3399		1770	3470	
Peak-hour factor, PHF	0.91	0.91	0.91	0.86	0.86	0.86	0.83	0.83	0.83	0.92	0.92	0.92
Adj. Flow (vph)	64	1675	43	110	934	87	105	372	134	122	213	32
RTOR Reduction (vph)	0	2	0	0	8	0	0	31	0	0	10	0
Lane Group Flow (vph)	64	1716	0	110	1013	0	105	475	0	122	235	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.7	56.4		11.4	60.1		9.3	19.9		10.1	20.7	
Effective Green, g (s)	8.9	57.6		12.6	61.3		11.2	21.8		12.0	22.6	
Actuated g/C Ratio	0.07	0.48		0.10	0.51		0.09	0.18		0.10	0.19	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	131	2432		186	2564		165	617		177	654	
v/s Ratio Prot	0.04	c0.34		c0.06	0.20		0.06	c0.14		c0.07	0.07	
v/s Ratio Perm												
v/c Ratio	0.49	0.71		0.59	0.39		0.64	0.77		0.69	0.36	
Uniform Delay, d1	53.4	24.5		51.2	18.0		52.4	46.7		52.2	42.4	
Progression Factor	1.36	0.40		1.07	1.35		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.0		3.3	0.4		5.8	5.8		8.6	0.3	
Delay (s)	72.9	10.8		57.9	24.8		58.2	52.5		60.8	42.7	
Level of Service	E	B		E	C		E	D		E	D	
Approach Delay (s)		13.0			28.0			53.5			48.7	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



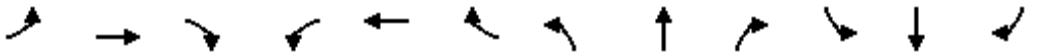
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	1589	95	158	840	123	73	347	171	114	197	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5042		1770	4988		1770	3364		1770	3439	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5042		1770	4988		1770	3364		1770	3439	
Peak-hour factor, PHF	0.97	0.97	0.97	0.86	0.86	0.86	0.84	0.84	0.84	0.64	0.64	0.64
Adj. Flow (vph)	208	1638	98	184	977	143	87	413	204	178	308	72
RTOR Reduction (vph)	0	6	0	0	16	0	0	51	0	0	16	0
Lane Group Flow (vph)	208	1730	0	184	1104	0	87	566	0	178	364	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	15.0	48.4		12.9	46.3		10.3	21.8		14.5	26.0	
Effective Green, g (s)	16.3	49.7		14.2	47.6		12.2	23.7		16.4	27.9	
Actuated g/C Ratio	0.14	0.41		0.12	0.40		0.10	0.20		0.14	0.23	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	240	2088		209	1979		180	664		242	800	
v/s Ratio Prot	c0.12	c0.34		0.10	0.22		0.05	c0.17		c0.10	0.11	
v/s Ratio Perm												
v/c Ratio	0.87	0.83		0.88	0.56		0.48	0.85		0.74	0.45	
Uniform Delay, d1	50.8	31.4		52.1	28.0		50.9	46.5		49.7	39.5	
Progression Factor	1.00	1.00		1.14	0.76		1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.6	4.0		30.4	1.1		0.7	10.3		9.6	0.4	
Delay (s)	76.4	35.3		89.6	22.4		51.7	56.8		59.3	39.9	
Level of Service	E	D		F	C		D	E		E	D	
Approach Delay (s)		39.7			31.9			56.2			46.1	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM Average Control Delay	40.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



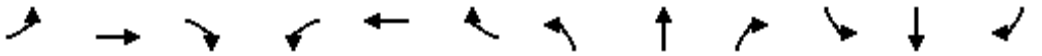
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2248	215	91	1006	8	132	0	161	0	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			5.9	4.0		4.0	
Lane Util. Factor		0.91		1.00	0.91			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.96	
Flt Protected		1.00		0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)		5019		1770	5079			1770	1583		1779	
Flt Permitted		1.00		0.95	1.00			0.76	1.00		1.00	
Satd. Flow (perm)		5019		1770	5079			1408	1583		1779	
Peak-hour factor, PHF	0.74	0.74	0.74	0.93	0.93	0.93	0.92	0.92	0.92	0.84	0.84	0.84
Adj. Flow (vph)	0	3038	291	98	1082	9	143	0	175	0	2	1
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	113	0	1	0
Lane Group Flow (vph)	0	3321	0	98	1091	0	0	143	62	0	2	0
Turn Type				Prot			Perm		Perm	Perm		
Protected Phases		2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)		77.4		9.2	91.9			16.9	16.9		16.9	
Effective Green, g (s)		78.7		10.5	93.2			16.9	18.8		18.8	
Actuated g/C Ratio		0.66		0.09	0.78			0.14	0.16		0.16	
Clearance Time (s)		5.3		5.3	5.3			5.9	5.9		5.9	
Vehicle Extension (s)		3.0		2.5	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)		3292		155	3945			198	248		279	
v/s Ratio Prot		c0.66		c0.06	0.21						0.00	
v/s Ratio Perm								c0.10	0.04			
v/c Ratio		1.01		0.63	0.28			0.72	0.25		0.01	
Uniform Delay, d1		20.6		52.9	3.8			49.3	44.4		42.7	
Progression Factor		1.34		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		16.4		7.2	0.2			11.5	0.4		0.0	
Delay (s)		44.1		60.0	4.0			60.8	44.8		42.7	
Level of Service		D		E	A			E	D		D	
Approach Delay (s)		44.1			8.6			52.0			42.7	
Approach LOS		D			A			D			D	

Intersection Summary			
HCM Average Control Delay	35.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



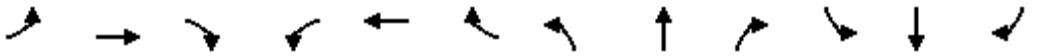
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	1989	95	0	1115	69	73	347	171	272	387	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	5.5	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91			0.91	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	0.99			1.00	0.85	1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5051			5085	1583	1770	3364		3433	3451	
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5051			5085	1583	1770	3364		3433	3451	
Peak-hour factor, PHF	0.97	0.97	0.97	0.91	0.91	0.91	0.84	0.84	0.84	0.90	0.90	0.90
Adj. Flow (vph)	208	2051	98	0	1225	76	87	413	204	302	430	86
RTOR Reduction (vph)	0	4	0	0	0	50	0	12	0	0	14	0
Lane Group Flow (vph)	208	2145	0	0	1225	26	87	605	0	302	502	0
Turn Type	Prot			Perm		Perm	Prot			Prot		
Protected Phases	5	2			6		3	8		7	4	
Permitted Phases				6		6						
Actuated Green, G (s)	18.3	65.2			41.4	41.4	9.6	24.8		13.5	28.7	
Effective Green, g (s)	19.8	66.7			42.9	41.4	11.1	26.3		15.0	30.2	
Actuated g/C Ratio	0.16	0.56			0.36	0.34	0.09	0.22		0.12	0.25	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	292	2808			1818	546	164	737		429	869	
v/s Ratio Prot	0.12	c0.42			0.24		0.05	c0.18		c0.09	0.15	
v/s Ratio Perm						0.02						
v/c Ratio	0.71	0.76			0.67	0.05	0.53	0.82		0.70	0.58	
Uniform Delay, d1	47.4	20.6			32.6	26.2	52.0	44.6		50.4	39.3	
Progression Factor	0.73	0.61			0.99	1.11	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	1.0			2.0	0.2	1.6	7.3		4.3	0.9	
Delay (s)	38.3	13.6			34.3	29.1	53.6	51.9		54.6	40.2	
Level of Service	D	B			C	C	D	D		D	D	
Approach Delay (s)		15.8			34.0			52.1			45.6	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM Average Control Delay	30.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



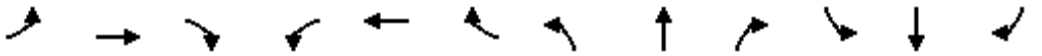
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	2001	137	120	831	27	159	149	206	91	155	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.91		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5037		3433	5061		1770	3231		1770	3397	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5037		3433	5061		1770	3231		1770	3397	
Peak-hour factor, PHF	0.87	0.87	0.87	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91
Adj. Flow (vph)	45	2300	157	129	894	29	177	166	229	100	170	62
RTOR Reduction (vph)	0	6	0	0	3	0	0	98	0	0	32	0
Lane Group Flow (vph)	45	2451	0	129	920	0	177	297	0	100	200	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	6.0	64.1		6.8	64.9		15.0	19.0		8.3	12.3	
Effective Green, g (s)	7.2	65.3		8.0	66.1		16.7	20.7		10.0	14.0	
Actuated g/C Ratio	0.06	0.54		0.07	0.55		0.14	0.17		0.08	0.12	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.7	5.7		5.7	5.7	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	106	2741		229	2788		246	557		148	396	
v/s Ratio Prot	0.03	c0.49		c0.04	0.18		c0.10	c0.09		c0.06	0.06	
v/s Ratio Perm												
v/c Ratio	0.42	0.89		0.56	0.33		0.72	0.53		0.68	0.51	
Uniform Delay, d1	54.4	24.3		54.3	14.8		49.4	45.3		53.4	49.8	
Progression Factor	1.25	0.50		0.54	0.14		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	4.5		1.9	0.2		9.0	1.0		10.5	1.0	
Delay (s)	69.7	16.7		31.2	2.4		58.4	46.2		64.0	50.8	
Level of Service	E	B		C	A		E	D		E	D	
Approach Delay (s)		17.6			5.9			50.0			54.7	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



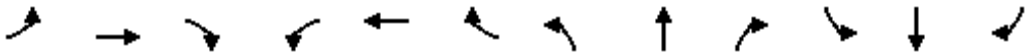
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	1692	1	44	877	34	29	18	25	51	5	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	5.3
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.96	1.00
Satd. Flow (prot)	1770	5085		1770	5057			1807	1583		1782	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.77	1.00		0.67	1.00
Satd. Flow (perm)	1770	5085		1770	5057			1443	1583		1252	1583
Peak-hour factor, PHF	0.79	0.79	0.79	0.96	0.96	0.96	0.67	0.67	0.67	0.88	0.88	0.88
Adj. Flow (vph)	114	2142	1	46	914	35	43	27	37	58	6	57
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	33	0	0	52
Lane Group Flow (vph)	114	2143	0	46	947	0	0	70	4	0	64	5
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8		8	4		4
Actuated Green, G (s)	12.1	87.9		6.7	82.5			10.1	10.1		10.1	10.1
Effective Green, g (s)	13.1	88.9		7.7	83.5			11.4	11.4		11.4	10.1
Actuated g/C Ratio	0.11	0.74		0.06	0.70			0.10	0.10		0.10	0.08
Clearance Time (s)	5.0	5.0		5.0	5.0			5.3	5.3		5.3	5.3
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	193	3767		114	3519			137	150		119	133
v/s Ratio Prot	c0.06	c0.42		0.03	0.19							
v/s Ratio Perm								0.05	0.00		c0.05	0.00
v/c Ratio	0.59	0.57		0.40	0.27			0.51	0.02		0.54	0.04
Uniform Delay, d1	50.9	7.0		53.9	6.8			51.6	49.3		51.8	50.5
Progression Factor	1.22	0.26		1.24	0.69			1.00	1.00		1.00	1.00
Incremental Delay, d2	2.6	0.5		0.8	0.2			2.4	0.0		3.6	0.1
Delay (s)	64.7	2.3		67.5	4.9			54.0	49.3		55.4	50.6
Level of Service	E	A		E	A			D	D		E	D
Approach Delay (s)		5.5			7.8			52.4			53.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



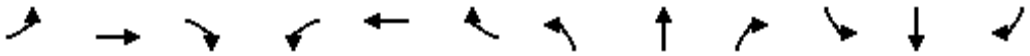
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	1524	39	95	803	75	87	309	111	112	196	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	0.99		1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5066		1770	5020		1770	3399		1770	3470	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5066		1770	5020		1770	3399		1770	3470	
Peak-hour factor, PHF	0.91	0.91	0.91	0.86	0.86	0.86	0.83	0.83	0.83	0.92	0.92	0.92
Adj. Flow (vph)	64	1675	43	110	934	87	105	372	134	122	213	32
RTOR Reduction (vph)	0	2	0	0	8	0	0	31	0	0	10	0
Lane Group Flow (vph)	64	1716	0	110	1013	0	105	475	0	122	235	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.7	56.4		11.4	60.1		9.3	19.9		10.1	20.7	
Effective Green, g (s)	8.9	57.6		12.6	61.3		11.2	21.8		12.0	22.6	
Actuated g/C Ratio	0.07	0.48		0.10	0.51		0.09	0.18		0.10	0.19	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	131	2432		186	2564		165	617		177	654	
v/s Ratio Prot	0.04	c0.34		c0.06	0.20		0.06	c0.14		c0.07	0.07	
v/s Ratio Perm												
v/c Ratio	0.49	0.71		0.59	0.39		0.64	0.77		0.69	0.36	
Uniform Delay, d1	53.4	24.5		51.2	18.0		52.4	46.7		52.2	42.4	
Progression Factor	1.36	0.40		0.94	1.12		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.0		3.3	0.5		5.8	5.8		8.6	0.3	
Delay (s)	72.9	10.8		51.2	20.7		58.2	52.5		60.8	42.7	
Level of Service	E	B		D	C		E	D		E	D	
Approach Delay (s)		13.0			23.6			53.5			48.7	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM Average Control Delay	25.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	1589	95	158	840	123	73	347	171	114	197	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5042		1770	4988		1770	3364		1770	3439	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5042		1770	4988		1770	3364		1770	3439	
Peak-hour factor, PHF	0.97	0.97	0.97	0.86	0.86	0.86	0.84	0.84	0.84	0.64	0.64	0.64
Adj. Flow (vph)	208	1638	98	184	977	143	87	413	204	178	308	72
RTOR Reduction (vph)	0	6	0	0	16	0	0	51	0	0	16	0
Lane Group Flow (vph)	208	1730	0	184	1104	0	87	566	0	178	364	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	15.0	48.4		12.9	46.3		10.3	21.8		14.5	26.0	
Effective Green, g (s)	16.3	49.7		14.2	47.6		12.2	23.7		16.4	27.9	
Actuated g/C Ratio	0.14	0.41		0.12	0.40		0.10	0.20		0.14	0.23	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	240	2088		209	1979		180	664		242	800	
v/s Ratio Prot	c0.12	c0.34		0.10	0.22		0.05	c0.17		c0.10	0.11	
v/s Ratio Perm												
v/c Ratio	0.87	0.83		0.88	0.56		0.48	0.85		0.74	0.45	
Uniform Delay, d1	50.8	31.4		52.1	28.0		50.9	46.5		49.7	39.5	
Progression Factor	1.00	1.00		1.25	0.62		1.00	1.00		1.00	1.00	
Incremental Delay, d2	25.6	4.0		30.4	1.1		0.7	10.3		9.6	0.4	
Delay (s)	76.4	35.3		95.7	18.6		51.7	56.8		59.3	39.9	
Level of Service	E	D		F	B		D	E		E	D	
Approach Delay (s)		39.7			29.5			56.2			46.1	
Approach LOS		D			C			E			D	

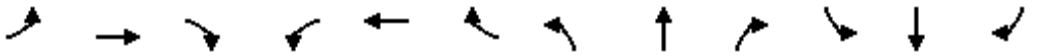
Intersection Summary			
HCM Average Control Delay	40.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2248	215	91	1006	8	132	0	161	0	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			5.9	4.0		4.0	
Lane Util. Factor		0.91		1.00	0.91			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.97	
Flt Protected		1.00		0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)		5019		1770	5079			1770	1583		1800	
Flt Permitted		1.00		0.95	1.00			0.76	1.00		1.00	
Satd. Flow (perm)		5019		1770	5079			1407	1583		1800	
Peak-hour factor, PHF	0.74	0.74	0.74	0.93	0.93	0.93	0.92	0.92	0.92	0.84	0.84	0.84
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	0	3554	340	114	1266	10	168	0	205	0	3	1
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	110	0	1	0
Lane Group Flow (vph)	0	3886	0	114	1276	0	0	168	95	0	3	0
Turn Type				Prot			Perm		Perm	Perm		
Protected Phases		2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)		75.5		9.4	90.2			18.6	18.6		18.6	
Effective Green, g (s)		76.8		10.7	91.5			18.6	20.5		20.5	
Actuated g/C Ratio		0.64		0.09	0.76			0.16	0.17		0.17	
Clearance Time (s)		5.3		5.3	5.3			5.9	5.9		5.9	
Vehicle Extension (s)		3.0		2.5	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)		3212		158	3873			218	270		308	
v/s Ratio Prot		c0.77		c0.06	0.25						0.00	
v/s Ratio Perm								c0.12	0.06			
v/c Ratio		1.21		0.72	0.33			0.77	0.35		0.01	
Uniform Delay, d1		21.6		53.2	4.5			48.7	43.9		41.3	
Progression Factor		1.46		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		96.5		14.1	0.2			14.8	0.6		0.0	
Delay (s)		128.1		67.3	4.7			63.5	44.5		41.3	
Level of Service		F		E	A			E	D		D	
Approach Delay (s)		128.1			9.9			53.0			41.3	
Approach LOS		F			A			D			D	

Intersection Summary			
HCM Average Control Delay	94.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

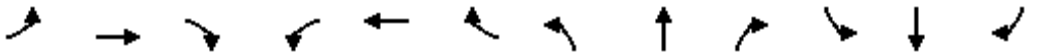
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	1989	95	0	1115	69	73	347	171	272	387	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	5.5
Lane Util. Factor	1.00	0.91			0.91		1.00	0.91		1.00	0.95	1.00
Frt	1.00	0.99			0.99		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	5050			5041		1770	4833		1770	3539	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	5050			5041		1770	4833		1770	3539	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.91	0.91	0.91	0.84	0.84	0.84	0.90	0.90	0.90
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	244	2399	115	0	1434	89	102	483	238	354	503	100
RTOR Reduction (vph)	0	4	0	0	5	0	0	31	0	0	0	72
Lane Group Flow (vph)	244	2510	0	0	1518	0	102	690	0	354	503	28
Turn Type	Prot			Perm			Prot			Prot		Perm
Protected Phases	5	2			6		3	8		7	4	
Permitted Phases				6								4
Actuated Green, G (s)	16.4	60.1			38.2		10.3	19.5		23.9	33.1	33.1
Effective Green, g (s)	17.9	61.6			39.7		11.8	21.0		25.4	34.6	33.1
Actuated g/C Ratio	0.15	0.51			0.33		0.10	0.18		0.21	0.29	0.28
Clearance Time (s)	5.5	5.5			5.5		5.5	5.5		5.5	5.5	5.5
Vehicle Extension (s)	2.0	3.0			3.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)	264	2592			1668		174	846		375	1020	437
v/s Ratio Prot	0.14	c0.50			0.30		0.06	c0.14		c0.20	0.14	
v/s Ratio Perm												0.02
v/c Ratio	0.92	0.97			0.91		0.59	0.82		0.94	0.49	0.06
Uniform Delay, d1	50.4	28.3			38.4		51.8	47.6		46.6	35.4	32.0
Progression Factor	0.63	0.38			0.99		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.5	1.7			8.6		3.2	6.1		31.9	0.4	0.1
Delay (s)	37.2	12.5			46.7		55.0	53.7		78.5	35.8	32.1
Level of Service	D	B			D		D	D		E	D	C
Approach Delay (s)		14.7			46.7			53.9			51.2	
Approach LOS		B			D			D			D	

Intersection Summary			
HCM Average Control Delay	33.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.1%	ICU Level of Service	F
Analysis Period (min)	15		

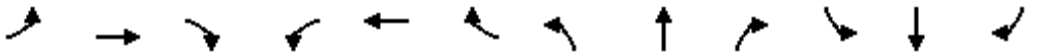
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	2001	137	120	831	27	159	149	206	91	155	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.91		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5036		1770	5061		1770	3231		1770	3398	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5036		1770	5061		1770	3231		1770	3398	
Peak-hour factor, PHF	0.87	0.87	0.87	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	52	2691	184	151	1045	34	207	194	268	117	199	72
RTOR Reduction (vph)	0	6	0	0	2	0	0	152	0	0	33	0
Lane Group Flow (vph)	52	2869	0	151	1077	0	207	310	0	117	238	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.0	55.3		10.8	59.1		18.5	23.0		9.1	13.6	
Effective Green, g (s)	8.2	56.5		12.0	60.3		20.2	24.7		10.8	15.3	
Actuated g/C Ratio	0.07	0.47		0.10	0.50		0.17	0.21		0.09	0.13	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.7	5.7		5.7	5.7	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	121	2371		177	2543		298	665		159	433	
v/s Ratio Prot	0.03	c0.57		c0.09	0.21		c0.12	0.10		c0.07	c0.07	
v/s Ratio Perm												
v/c Ratio	0.43	1.21		0.85	0.42		0.69	0.47		0.74	0.55	
Uniform Delay, d1	53.7	31.8		53.1	18.9		47.0	41.9		53.2	49.1	
Progression Factor	1.28	0.48		0.53	0.47		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	97.9		17.9	0.3		6.3	0.5		15.3	1.4	
Delay (s)	69.9	113.1		46.1	9.1		53.3	42.4		68.5	50.5	
Level of Service	E	F		D	A		D	D		E	D	
Approach Delay (s)		112.3			13.7			45.8			56.0	
Approach LOS		F			B			D			E	

Intersection Summary			
HCM Average Control Delay	76.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		

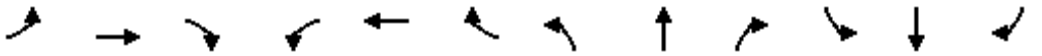
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	1692	1	44	877	34	29	18	25	51	5	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.98	
Satd. Flow (prot)	1770	5085		1770	5057			1807	1583		1704	
Flt Permitted	0.95	1.00		0.95	1.00			0.68	1.00		0.76	
Satd. Flow (perm)	1770	5085		1770	5057			1269	1583		1326	
Peak-hour factor, PHF	0.79	0.79	0.79	0.96	0.96	0.96	0.67	0.67	0.67	0.88	0.88	0.88
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	133	2506	1	54	1069	41	51	31	44	68	7	66
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	38	0	29	0
Lane Group Flow (vph)	133	2507	0	54	1108	0	0	82	6	0	112	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)	13.1	82.2		7.2	76.3			15.3	15.3		15.3	
Effective Green, g (s)	14.1	83.2		8.2	77.3			16.6	16.6		16.6	
Actuated g/C Ratio	0.12	0.69		0.07	0.64			0.14	0.14		0.14	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.3	5.3		5.3	
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)	208	3526		121	3258			176	219		183	
v/s Ratio Prot	c0.08	c0.49		0.03	0.22							
v/s Ratio Perm								0.06	0.00		c0.08	
v/c Ratio	0.64	0.71		0.45	0.34			0.47	0.03		0.61	
Uniform Delay, d1	50.5	11.1		53.7	9.7			47.6	44.7		48.7	
Progression Factor	1.26	0.30		1.16	0.57			1.00	1.00		1.00	
Incremental Delay, d2	3.3	0.9		0.9	0.3			1.4	0.0		5.1	
Delay (s)	67.1	4.2		63.0	5.8			49.0	44.8		53.7	
Level of Service	E	A		E	A			D	D		D	
Approach Delay (s)		7.4			8.5			47.5			53.7	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	10.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

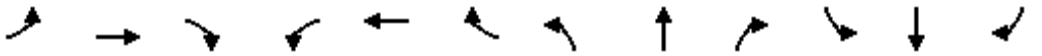
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	1524	39	95	803	75	87	309	111	112	196	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	0.99		1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5066		1770	5020		1770	3399		1770	3471	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5066		1770	5020		1770	3399		1770	3471	
Peak-hour factor, PHF	0.91	0.91	0.91	0.86	0.86	0.86	0.83	0.83	0.83	0.92	0.92	0.92
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	75	1959	50	129	1092	102	123	436	156	142	249	37
RTOR Reduction (vph)	0	2	0	0	8	0	0	30	0	0	10	0
Lane Group Flow (vph)	75	2007	0	129	1186	0	123	562	0	142	276	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	8.2	56.7		11.0	59.5		8.9	20.8		9.3	21.2	
Effective Green, g (s)	9.4	57.9		12.2	60.7		10.8	22.7		11.2	23.1	
Actuated g/C Ratio	0.08	0.48		0.10	0.51		0.09	0.19		0.09	0.19	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	139	2444		180	2539		159	643		165	668	
v/s Ratio Prot	0.04	c0.40		c0.07	0.24		0.07	c0.17		c0.08	0.08	
v/s Ratio Perm												
v/c Ratio	0.54	0.82		0.72	0.47		0.77	0.87		0.86	0.41	
Uniform Delay, d1	53.2	26.6		52.2	19.2		53.4	47.3		53.6	42.5	
Progression Factor	1.35	0.37		0.97	1.21		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	1.2		10.4	0.6		18.9	12.6		33.0	0.4	
Delay (s)	72.5	11.0		61.2	23.7		72.3	59.8		86.6	42.9	
Level of Service	E	B		E	C		E	E		F	D	
Approach Delay (s)		13.2			27.4			62.0			57.4	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		

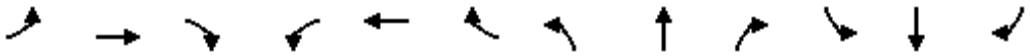
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	1589	95	158	840	123	73	347	171	114	197	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5042		1770	4988		1770	3364		1770	3439	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5042		1770	4988		1770	3364		1770	3439	
Peak-hour factor, PHF	0.97	0.97	0.97	0.86	0.86	0.86	0.84	0.84	0.84	0.64	0.64	0.64
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	244	1917	115	215	1143	167	102	483	238	208	360	84
RTOR Reduction (vph)	0	6	0	0	16	0	0	50	0	0	16	0
Lane Group Flow (vph)	244	2026	0	215	1294	0	102	671	0	208	428	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	14.7	49.7		9.7	44.7		11.3	22.9		15.3	26.9	
Effective Green, g (s)	16.0	51.0		11.0	46.0		13.2	24.8		17.2	28.8	
Actuated g/C Ratio	0.13	0.42		0.09	0.38		0.11	0.21		0.14	0.24	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	236	2143		162	1912		195	695		254	825	
v/s Ratio Prot	c0.14	c0.40		c0.12	0.26		0.06	c0.20		c0.12	c0.12	
v/s Ratio Perm												
v/c Ratio	1.03	0.95		1.33	0.68		0.52	0.97		0.82	0.52	
Uniform Delay, d1	52.0	33.2		54.5	30.8		50.4	47.2		49.9	39.6	
Progression Factor	1.00	1.00		1.25	0.69		1.00	1.00		1.00	1.00	
Incremental Delay, d2	67.7	10.3		181.3	1.8		1.2	25.6		17.4	0.6	
Delay (s)	119.7	43.4		249.4	23.0		51.6	72.8		67.3	40.1	
Level of Service	F	D		F	C		D	E		E	D	
Approach Delay (s)		51.6			54.9			70.2			48.8	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM Average Control Delay	55.1	HCM Level of Service	E
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		

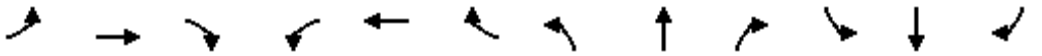
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2248	215	91	1006	8	132	0	161	0	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			5.9	4.0		4.0	
Lane Util. Factor		0.91		1.00	0.91			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.97	
Flt Protected		1.00		0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)		5019		1770	5079			1770	1583		1800	
Flt Permitted		1.00		0.95	1.00			0.76	1.00		1.00	
Satd. Flow (perm)		5019		1770	5079			1407	1583		1800	
Peak-hour factor, PHF	0.74	0.74	0.74	0.93	0.93	0.93	0.92	0.92	0.92	0.84	0.84	0.84
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	0	3554	340	114	1266	10	168	0	205	0	3	1
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	110	0	1	0
Lane Group Flow (vph)	0	3886	0	114	1276	0	0	168	95	0	3	0
Turn Type				Prot			Perm		Perm	Perm		
Protected Phases		2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)		75.5		9.4	90.2			18.6	18.6		18.6	
Effective Green, g (s)		76.8		10.7	91.5			18.6	20.5		20.5	
Actuated g/C Ratio		0.64		0.09	0.76			0.16	0.17		0.17	
Clearance Time (s)		5.3		5.3	5.3			5.9	5.9		5.9	
Vehicle Extension (s)		3.0		2.5	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)		3212		158	3873			218	270		308	
v/s Ratio Prot		c0.77		c0.06	0.25						0.00	
v/s Ratio Perm								c0.12	0.06			
v/c Ratio		1.21		0.72	0.33			0.77	0.35		0.01	
Uniform Delay, d1		21.6		53.2	4.5			48.7	43.9		41.3	
Progression Factor		1.27		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		96.8		14.1	0.2			14.8	0.6		0.0	
Delay (s)		124.2		67.3	4.7			63.5	44.5		41.3	
Level of Service		F		E	A			E	D		D	
Approach Delay (s)		124.2			9.9			53.0			41.3	
Approach LOS		F			A			D			D	

Intersection Summary			
HCM Average Control Delay	91.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

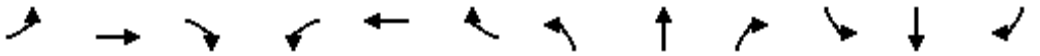
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	1989	95	0	1115	69	73	347	171	272	387	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	5.5	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91			0.91	1.00	1.00	0.91		0.97	0.95	
Frt	1.00	0.99			1.00	0.85	1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5050			5085	1583	1770	4833		3433	3451	
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5050			5085	1583	1770	4833		3433	3451	
Peak-hour factor, PHF	0.97	0.97	0.97	0.91	0.91	0.91	0.84	0.84	0.84	0.90	0.90	0.90
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	244	2399	115	0	1434	89	102	483	238	354	503	100
RTOR Reduction (vph)	0	4	0	0	0	55	0	8	0	0	14	0
Lane Group Flow (vph)	244	2510	0	0	1434	34	102	713	0	354	589	0
Turn Type	Prot			Perm		Perm	Prot			Prot		
Protected Phases	5	2			6		3	8		7	4	
Permitted Phases				6		6						
Actuated Green, G (s)	21.2	68.7			42.0	42.0	9.0	20.1		14.7	25.8	
Effective Green, g (s)	22.7	70.2			43.5	42.0	10.5	21.6		16.2	27.3	
Actuated g/C Ratio	0.19	0.59			0.36	0.35	0.09	0.18		0.13	0.23	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	3.0			3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	335	2954			1843	554	155	870		463	785	
v/s Ratio Prot	0.14	c0.50			0.28		0.06	c0.15		0.10	c0.17	
v/s Ratio Perm						0.02						
v/c Ratio	0.73	0.85			0.78	0.06	0.66	0.82		0.76	0.75	
Uniform Delay, d1	45.8	20.5			34.0	25.9	53.0	47.3		50.1	43.2	
Progression Factor	0.70	0.47			0.99	1.07	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	1.0			3.2	0.2	7.5	6.1		6.7	4.1	
Delay (s)	34.2	10.6			36.9	27.9	60.5	53.4		56.7	47.2	
Level of Service	C	B			D	C	E	D		E	D	
Approach Delay (s)		12.7			36.3			54.3			50.7	
Approach LOS		B			D			D			D	

Intersection Summary			
HCM Average Control Delay	30.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		

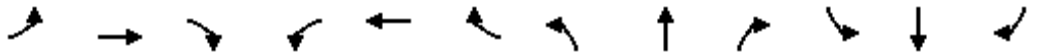
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	2001	137	120	831	27	159	149	206	91	155	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.91		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5036		3433	5061		1770	3231		1770	3398	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5036		3433	5061		1770	3231		1770	3398	
Peak-hour factor, PHF	0.87	0.87	0.87	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	52	2691	184	151	1045	34	207	194	268	117	199	72
RTOR Reduction (vph)	0	7	0	0	3	0	0	82	0	0	31	0
Lane Group Flow (vph)	52	2869	0	151	1076	0	207	380	0	117	240	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.4	66.8		4.8	64.2		16.4	15.5		11.1	10.2	
Effective Green, g (s)	8.6	68.0		6.0	65.4		18.1	17.2		12.8	11.9	
Actuated g/C Ratio	0.07	0.57		0.05	0.55		0.15	0.14		0.11	0.10	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.7	5.7		5.7	5.7	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	127	2854		172	2758		267	463		189	337	
v/s Ratio Prot	0.03	c0.57		c0.04	0.21		0.12	c0.12		0.07	c0.07	
v/s Ratio Perm												
v/c Ratio	0.41	1.01		0.88	0.39		0.78	0.82		0.62	0.71	
Uniform Delay, d1	53.3	26.0		56.6	15.8		49.0	49.9		51.3	52.4	
Progression Factor	1.29	0.37		0.50	0.17		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	16.4		25.2	0.3		12.7	11.1		5.1	7.0	
Delay (s)	70.0	25.9		53.5	2.9		61.6	61.0		56.3	59.4	
Level of Service	E	C		D	A		E	E		E	E	
Approach Delay (s)		26.7			9.1			61.2			58.5	
Approach LOS		C			A			E			E	

Intersection Summary			
HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		

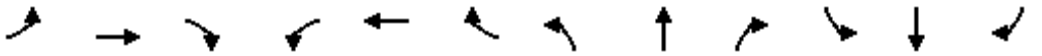
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	1692	1	44	877	34	29	18	25	51	5	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	5.3
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.96	1.00
Satd. Flow (prot)	1770	5085		1770	5057			1807	1583		1782	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.74	1.00		0.64	1.00
Satd. Flow (perm)	1770	5085		1770	5057			1370	1583		1189	1583
Peak-hour factor, PHF	0.79	0.79	0.79	0.96	0.96	0.96	0.67	0.67	0.67	0.88	0.88	0.88
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	133	2506	1	54	1069	41	51	31	44	68	7	66
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	39	0	0	59
Lane Group Flow (vph)	133	2507	0	54	1108	0	0	82	5	0	75	7
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8		8	4		4
Actuated Green, G (s)	13.3	84.3		7.2	78.2			13.2	13.2		13.2	13.2
Effective Green, g (s)	14.3	85.3		8.2	79.2			14.5	14.5		14.5	13.2
Actuated g/C Ratio	0.12	0.71		0.07	0.66			0.12	0.12		0.12	0.11
Clearance Time (s)	5.0	5.0		5.0	5.0			5.3	5.3		5.3	5.3
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	211	3615		121	3338			166	191		144	174
v/s Ratio Prot	c0.08	c0.49		0.03	0.22							
v/s Ratio Perm								0.06	0.00		c0.06	0.00
v/c Ratio	0.63	0.69		0.45	0.33			0.49	0.03		0.52	0.04
Uniform Delay, d1	50.3	9.9		53.7	8.9			49.3	46.5		49.5	47.7
Progression Factor	1.24	0.24		1.18	0.52			1.00	1.00		1.00	1.00
Incremental Delay, d2	3.2	0.8		0.9	0.2			1.7	0.0		2.6	0.1
Delay (s)	65.4	3.2		64.1	4.9			51.0	46.6		52.1	47.8
Level of Service	E	A		E	A			D	D		D	D
Approach Delay (s)		6.3			7.6			49.5			50.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

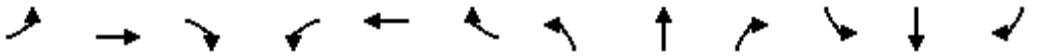
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	1524	39	95	803	75	87	309	111	112	196	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	0.99		1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5066		1770	5020		1770	3399		1770	3471	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5066		1770	5020		1770	3399		1770	3471	
Peak-hour factor, PHF	0.91	0.91	0.91	0.86	0.86	0.86	0.83	0.83	0.83	0.92	0.92	0.92
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	75	1959	50	129	1092	102	123	436	156	142	249	37
RTOR Reduction (vph)	0	2	0	0	8	0	0	30	0	0	10	0
Lane Group Flow (vph)	75	2007	0	129	1186	0	123	562	0	142	276	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	8.2	56.7		11.0	59.5		8.9	20.8		9.3	21.2	
Effective Green, g (s)	9.4	57.9		12.2	60.7		10.8	22.7		11.2	23.1	
Actuated g/C Ratio	0.08	0.48		0.10	0.51		0.09	0.19		0.09	0.19	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	139	2444		180	2539		159	643		165	668	
v/s Ratio Prot	0.04	c0.40		c0.07	0.24		0.07	c0.17		c0.08	0.08	
v/s Ratio Perm												
v/c Ratio	0.54	0.82		0.72	0.47		0.77	0.87		0.86	0.41	
Uniform Delay, d1	53.2	26.6		52.2	19.2		53.4	47.3		53.6	42.5	
Progression Factor	1.35	0.37		0.96	1.13		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	1.2		10.5	0.6		18.9	12.6		33.0	0.4	
Delay (s)	72.5	11.0		60.5	22.3		72.3	59.8		86.6	42.9	
Level of Service	E	B		E	C		E	E		F	D	
Approach Delay (s)		13.2			26.0			62.0			57.4	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM Average Control Delay	28.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		

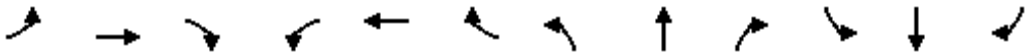
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	1589	95	158	840	123	73	347	171	114	197	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5042		1770	4988		1770	3364		1770	3439	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5042		1770	4988		1770	3364		1770	3439	
Peak-hour factor, PHF	0.97	0.97	0.97	0.86	0.86	0.86	0.84	0.84	0.84	0.64	0.64	0.64
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	244	1917	115	215	1143	167	102	483	238	208	360	84
RTOR Reduction (vph)	0	6	0	0	16	0	0	50	0	0	16	0
Lane Group Flow (vph)	244	2026	0	215	1294	0	102	671	0	208	428	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	14.7	49.7		9.7	44.7		11.3	22.9		15.3	26.9	
Effective Green, g (s)	16.0	51.0		11.0	46.0		13.2	24.8		17.2	28.8	
Actuated g/C Ratio	0.13	0.42		0.09	0.38		0.11	0.21		0.14	0.24	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	236	2143		162	1912		195	695		254	825	
v/s Ratio Prot	c0.14	c0.40		c0.12	0.26		0.06	c0.20		c0.12	c0.12	
v/s Ratio Perm												
v/c Ratio	1.03	0.95		1.33	0.68		0.52	0.97		0.82	0.52	
Uniform Delay, d1	52.0	33.2		54.5	30.8		50.4	47.2		49.9	39.6	
Progression Factor	1.00	1.00		1.29	0.63		1.00	1.00		1.00	1.00	
Incremental Delay, d2	67.7	10.3		181.3	1.8		1.2	25.6		17.4	0.6	
Delay (s)	119.7	43.4		251.8	21.2		51.6	72.8		67.3	40.1	
Level of Service	F	D		F	C		D	E		E	D	
Approach Delay (s)		51.6			53.7			70.2			48.8	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM Average Control Delay	54.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		

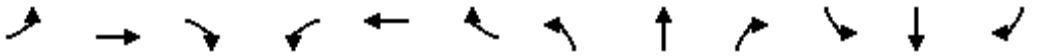
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2248	215	91	1006	8	132	0	161	0	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			5.9	4.0		4.0	
Lane Util. Factor		0.91		1.00	0.86			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.97	
Flt Protected		1.00		0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)		5019		1770	6400			1770	1583		1800	
Flt Permitted		1.00		0.95	1.00			0.76	1.00		1.00	
Satd. Flow (perm)		5019		1770	6400			1407	1583		1800	
Peak-hour factor, PHF	0.74	0.74	0.74	0.93	0.93	0.93	0.92	0.92	0.92	0.84	0.84	0.84
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	0	3554	340	114	1266	10	168	0	205	0	3	1
RTOR Reduction (vph)	0	9	0	0	1	0	0	0	66	0	1	0
Lane Group Flow (vph)	0	3885	0	114	1275	0	0	168	139	0	3	0
Turn Type				Prot			Perm		Perm	Perm		
Protected Phases		2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)		80.3		6.0	91.6			17.2	17.2		17.2	
Effective Green, g (s)		81.6		7.3	92.9			17.2	19.1		19.1	
Actuated g/C Ratio		0.68		0.06	0.77			0.14	0.16		0.16	
Clearance Time (s)		5.3		5.3	5.3			5.9	5.9		5.9	
Vehicle Extension (s)		3.0		2.5	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)		3413		108	4955			202	252		287	
v/s Ratio Prot		c0.77		c0.06	0.20						0.00	
v/s Ratio Perm								c0.12	0.09			
v/c Ratio		1.14		1.06	0.26			0.83	0.55		0.01	
Uniform Delay, d1		19.2		56.4	3.8			50.0	46.5		42.5	
Progression Factor		1.44		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		65.4		102.3	0.1			23.9	2.1		0.0	
Delay (s)		93.1		158.7	3.9			73.9	48.6		42.5	
Level of Service		F		F	A			E	D		D	
Approach Delay (s)		93.1			16.6			60.0			42.5	
Approach LOS		F			B			E			D	

Intersection Summary			
HCM Average Control Delay	72.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

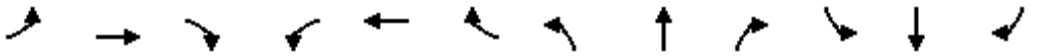
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	1989	95	20	1115	69	73	347	171	272	387	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	5.5	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.86	1.00	1.00	0.91		0.97	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5050		1770	6408	1583	1770	4833		3433	3451	
Flt Permitted	0.95	1.00		0.10	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5050		183	6408	1583	1770	4833		3433	3451	
Peak-hour factor, PHF	0.97	0.97	0.97	0.91	0.91	0.91	0.84	0.84	0.84	0.90	0.90	0.90
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	244	2399	115	26	1434	89	102	483	238	354	503	100
RTOR Reduction (vph)	0	4	0	0	0	60	0	7	0	0	14	0
Lane Group Flow (vph)	244	2510	0	26	1434	29	102	714	0	354	589	0
Turn Type	Prot			Perm		Perm	Prot			Prot		
Protected Phases	5	2			6		3	8		7	4	
Permitted Phases				6		6						
Actuated Green, G (s)	24.5	69.3		39.3	39.3	39.3	8.4	20.1		14.1	25.8	
Effective Green, g (s)	26.0	70.8		40.8	40.8	39.3	9.9	21.6		15.6	27.3	
Actuated g/C Ratio	0.22	0.59		0.34	0.34	0.33	0.08	0.18		0.13	0.23	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	3.0		3.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	384	2980		62	2179	518	146	870		446	785	
v/s Ratio Prot	0.14	c0.50			0.22		0.06	c0.15		0.10	c0.17	
v/s Ratio Perm				0.14		0.02						
v/c Ratio	0.64	0.84		0.42	0.66	0.06	0.70	0.82		0.79	0.75	
Uniform Delay, d1	42.7	20.0		30.5	33.7	27.6	53.6	47.3		50.6	43.2	
Progression Factor	0.68	0.44		0.99	0.99	1.21	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.9		19.0	1.5	0.2	11.1	6.2		8.8	4.1	
Delay (s)	29.8	9.7		49.1	34.8	33.6	64.7	53.6		59.4	47.2	
Level of Service	C	A		D	C	C	E	D		E	D	
Approach Delay (s)		11.5			35.0			55.0			51.7	
Approach LOS		B			D			D			D	

Intersection Summary			
HCM Average Control Delay	29.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		

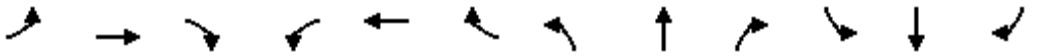
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	2001	137	120	831	27	159	149	206	91	155	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.86		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.91		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5036		1770	6378		1770	3231		1770	3398	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5036		1770	6378		1770	3231		1770	3398	
Peak-hour factor, PHF	0.87	0.87	0.87	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	52	2691	184	151	1045	34	207	194	268	117	199	72
RTOR Reduction (vph)	0	7	0	0	3	0	0	103	0	0	30	0
Lane Group Flow (vph)	52	2868	0	151	1076	0	207	359	0	117	241	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.4	66.4		7.8	66.8		15.7	14.9		9.1	8.3	
Effective Green, g (s)	8.6	67.6		9.0	68.0		17.4	16.6		10.8	10.0	
Actuated g/C Ratio	0.07	0.56		0.08	0.57		0.14	0.14		0.09	0.08	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.7	5.7		5.7	5.7	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	127	2837		133	3614		257	447		159	283	
v/s Ratio Prot	0.03	c0.57		c0.09	0.17		c0.12	0.11		0.07	c0.07	
v/s Ratio Perm												
v/c Ratio	0.41	1.01		1.14	0.30		0.81	0.80		0.74	0.85	
Uniform Delay, d1	53.3	26.2		55.5	13.6		49.7	50.1		53.2	54.3	
Progression Factor	1.29	0.38		0.55	0.11		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	18.0		110.1	0.2		16.2	10.0		15.3	21.0	
Delay (s)	69.8	27.9		140.4	1.6		65.8	60.1		68.5	75.3	
Level of Service	E	C		F	A		E	E		E	E	
Approach Delay (s)		28.6			18.7			61.9			73.2	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM Average Control Delay	33.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		

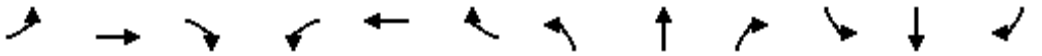
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	1692	1	44	877	34	29	18	25	51	5	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	5.0		4.0	4.0		4.0	5.3
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.97	1.00		0.96	1.00
Satd. Flow (prot)	1770	5085		1770	5085	1583		1807	1583		1782	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.74	1.00		0.64	1.00
Satd. Flow (perm)	1770	5085		1770	5085	1583		1370	1583		1189	1583
Peak-hour factor, PHF	0.79	0.79	0.79	0.96	0.96	0.96	0.67	0.67	0.67	0.88	0.88	0.88
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	133	2506	1	54	1069	41	51	31	44	68	7	66
RTOR Reduction (vph)	0	0	0	0	0	14	0	0	39	0	0	59
Lane Group Flow (vph)	133	2507	0	54	1069	27	0	82	5	0	75	7
Turn Type	Prot			Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8		8	4		4
Actuated Green, G (s)	13.3	84.3		7.2	78.2	78.2		13.2	13.2		13.2	13.2
Effective Green, g (s)	14.3	85.3		8.2	79.2	78.2		14.5	14.5		14.5	13.2
Actuated g/C Ratio	0.12	0.71		0.07	0.66	0.65		0.12	0.12		0.12	0.11
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.3	5.3		5.3	5.3
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0		2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	211	3615		121	3356	1032		166	191		144	174
v/s Ratio Prot	c0.08	c0.49		0.03	0.21							
v/s Ratio Perm						0.02		0.06	0.00		c0.06	0.00
v/c Ratio	0.63	0.69		0.45	0.32	0.03		0.49	0.03		0.52	0.04
Uniform Delay, d1	50.3	9.9		53.7	8.8	7.4		49.3	46.5		49.5	47.7
Progression Factor	1.24	0.24		1.21	0.56	0.36		1.00	1.00		1.00	1.00
Incremental Delay, d2	3.2	0.8		0.9	0.2	0.0		1.7	0.0		2.6	0.1
Delay (s)	65.4	3.1		65.7	5.1	2.7		51.0	46.6		52.1	47.8
Level of Service	E	A		E	A	A		D	D		D	D
Approach Delay (s)		6.3			7.8			49.5			50.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

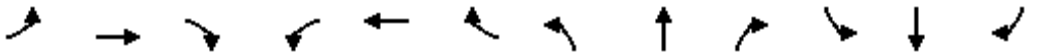
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	1524	39	95	803	75	87	309	111	112	196	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	1.00		1.00	0.99		1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5066		1770	5020		1770	3399		1770	3471	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5066		1770	5020		1770	3399		1770	3471	
Peak-hour factor, PHF	0.91	0.91	0.91	0.86	0.86	0.86	0.83	0.83	0.83	0.92	0.92	0.92
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	75	1959	50	129	1092	102	123	436	156	142	249	37
RTOR Reduction (vph)	0	2	0	0	8	0	0	30	0	0	10	0
Lane Group Flow (vph)	75	2007	0	129	1186	0	123	562	0	142	276	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	8.2	56.7		11.0	59.5		8.9	20.8		9.3	21.2	
Effective Green, g (s)	9.4	57.9		12.2	60.7		10.8	22.7		11.2	23.1	
Actuated g/C Ratio	0.08	0.48		0.10	0.51		0.09	0.19		0.09	0.19	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	139	2444		180	2539		159	643		165	668	
v/s Ratio Prot	0.04	c0.40		c0.07	0.24		0.07	c0.17		c0.08	0.08	
v/s Ratio Perm												
v/c Ratio	0.54	0.82		0.72	0.47		0.77	0.87		0.86	0.41	
Uniform Delay, d1	53.2	26.6		52.2	19.2		53.4	47.3		53.6	42.5	
Progression Factor	1.35	0.37		0.86	0.98		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	1.2		10.5	0.6		18.9	12.6		33.0	0.4	
Delay (s)	72.5	11.0		55.6	19.5		72.3	59.8		86.6	42.9	
Level of Service	E	B		E	B		E	E		F	D	
Approach Delay (s)		13.2			23.0			62.0			57.4	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM Average Control Delay	27.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		

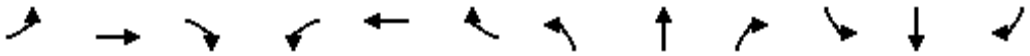
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	1589	95	158	840	123	73	347	171	114	197	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	0.98		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5042		1770	4988		1770	3364		1770	3439	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5042		1770	4988		1770	3364		1770	3439	
Peak-hour factor, PHF	0.97	0.97	0.97	0.86	0.86	0.86	0.84	0.84	0.84	0.64	0.64	0.64
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	244	1917	115	215	1143	167	102	483	238	208	360	84
RTOR Reduction (vph)	0	6	0	0	16	0	0	50	0	0	16	0
Lane Group Flow (vph)	244	2026	0	215	1294	0	102	671	0	208	428	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	14.7	49.7		9.7	44.7		11.3	22.9		15.3	26.9	
Effective Green, g (s)	16.0	51.0		11.0	46.0		13.2	24.8		17.2	28.8	
Actuated g/C Ratio	0.13	0.42		0.09	0.38		0.11	0.21		0.14	0.24	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	236	2143		162	1912		195	695		254	825	
v/s Ratio Prot	c0.14	c0.40		c0.12	0.26		0.06	c0.20		c0.12	c0.12	
v/s Ratio Perm												
v/c Ratio	1.03	0.95		1.33	0.68		0.52	0.97		0.82	0.52	
Uniform Delay, d1	52.0	33.2		54.5	30.8		50.4	47.2		49.9	39.6	
Progression Factor	1.00	1.00		1.28	0.61		1.00	1.00		1.00	1.00	
Incremental Delay, d2	67.7	10.3		181.3	1.8		1.2	25.6		17.4	0.6	
Delay (s)	119.7	43.4		251.1	20.5		51.6	72.8		67.3	40.1	
Level of Service	F	D		F	C		D	E		E	D	
Approach Delay (s)		51.6			53.0			70.2			48.8	
Approach LOS		D			D			E			D	

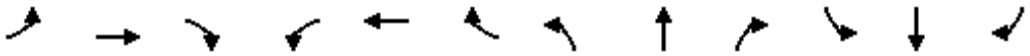
Intersection Summary			
HCM Average Control Delay	54.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



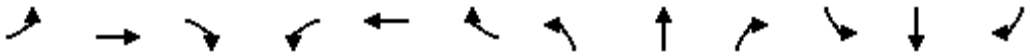
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1444	74	71	2535	0	99	0	80	3	4	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			5.9	4.0		4.0	
Lane Util. Factor		0.91		1.00	0.91			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.95	
Flt Protected		1.00		0.95	1.00			0.95	1.00		0.99	
Satd. Flow (prot)		5048		1770	5085			1770	1583		1739	
Flt Permitted		1.00		0.95	1.00			0.75	1.00		0.93	
Satd. Flow (perm)		5048		1770	5085			1393	1583		1638	
Peak-hour factor, PHF	0.88	0.88	0.88	0.91	0.91	0.91	0.92	0.92	0.92	0.84	0.84	0.84
Adj. Flow (vph)	0	1641	84	78	2786	0	108	0	87	4	5	6
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	75	0	4	0
Lane Group Flow (vph)	0	1721	0	78	2786	0	0	108	12	0	11	0
Turn Type				Prot			Perm		Perm	Perm		
Protected Phases		2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)		75.7		13.7	94.7			14.1	14.1		14.1	
Effective Green, g (s)		77.0		15.0	96.0			14.1	16.0		16.0	
Actuated g/C Ratio		0.64		0.12	0.80			0.12	0.13		0.13	
Clearance Time (s)		5.3		5.3	5.3			5.9	5.9		5.9	
Vehicle Extension (s)		3.0		2.5	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)		3239		221	4068			164	211		218	
v/s Ratio Prot		0.34		0.04	c0.55							
v/s Ratio Perm								c0.08	0.01		0.01	
v/c Ratio		0.53		0.35	0.68			0.66	0.05		0.05	
Uniform Delay, d1		11.7		48.1	5.3			50.6	45.4		45.4	
Progression Factor		0.99		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.4		0.7	1.0			8.2	0.1		0.1	
Delay (s)		11.9		48.8	6.3			58.9	45.5		45.4	
Level of Service		B		D	A			E	D		D	
Approach Delay (s)		11.9			7.4			52.9			45.4	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



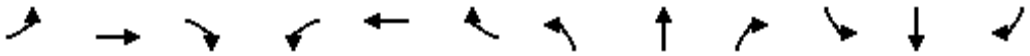
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1241	86	179	2357	281	99	527	99	188	658	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt		0.99		1.00	0.98		1.00	0.98		1.00	0.98	
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		5036		1770	5004		1770	3455		1770	3454	
Flt Permitted		1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		5036		1770	5004		1770	3455		1770	3454	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.86	0.86	0.86	0.88	0.88	0.88
Adj. Flow (vph)	0	1379	96	199	2619	312	115	613	115	214	748	144
RTOR Reduction (vph)	0	7	0	0	12	0	0	13	0	0	13	0
Lane Group Flow (vph)	0	1468	0	199	2919	0	115	715	0	214	879	0
Turn Type	Perm			Prot			Prot			Prot		
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2											
Actuated Green, G (s)		45.7		15.3	66.5		11.6	22.5		14.5	25.4	
Effective Green, g (s)		47.2		16.8	68.0		13.1	24.0		16.0	26.9	
Actuated g/C Ratio		0.39		0.14	0.57		0.11	0.20		0.13	0.22	
Clearance Time (s)		5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)		3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		1981		248	2836		193	691		236	774	
v/s Ratio Prot		0.29		0.11	c0.58		0.06	c0.21		0.12	c0.25	
v/s Ratio Perm												
v/c Ratio		0.74		0.80	1.03		0.60	1.04		0.91	1.14	
Uniform Delay, d1		31.2		50.0	26.0		50.9	48.0		51.3	46.6	
Progression Factor		0.95		0.93	1.02		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.7		12.9	23.1		3.3	43.6		33.7	76.5	
Delay (s)		31.4		59.4	49.7		54.2	91.6		85.0	123.0	
Level of Service		C		E	D		D	F		F	F	
Approach Delay (s)		31.4			50.4			86.5			115.7	
Approach LOS		C			D			F			F	

Intersection Summary			
HCM Average Control Delay	61.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	101.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



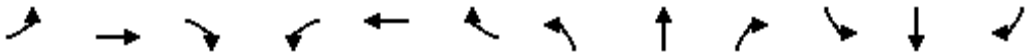
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	1054	152	259	2312	76	146	223	131	78	211	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	1.00		1.00	0.94		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4989		1770	5061		1770	3343		1770	3397	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4989		1770	5061		1770	3343		1770	3397	
Peak-hour factor, PHF	0.82	0.82	0.82	0.85	0.85	0.85	0.79	0.79	0.79	0.91	0.91	0.91
Adj. Flow (vph)	130	1285	185	305	2720	89	185	282	166	86	232	85
RTOR Reduction (vph)	0	15	0	0	3	0	0	70	0	0	32	0
Lane Group Flow (vph)	130	1455	0	305	2806	0	185	378	0	86	285	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	10.1	44.4		24.0	58.3		15.4	22.4		7.4	14.4	
Effective Green, g (s)	11.3	45.6		25.2	59.5		17.1	24.1		9.1	16.1	
Actuated g/C Ratio	0.09	0.38		0.21	0.50		0.14	0.20		0.08	0.13	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.7	5.7		5.7	5.7	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	167	1896		372	2509		252	671		134	456	
v/s Ratio Prot	0.07	0.29		c0.17	c0.55		c0.10	0.11		0.05	c0.08	
v/s Ratio Perm												
v/c Ratio	0.78	0.77		0.82	1.12		0.73	0.56		0.64	0.62	
Uniform Delay, d1	53.1	32.6		45.2	30.2		49.3	43.2		53.9	49.1	
Progression Factor	1.13	0.43		1.14	1.03		1.00	1.00		1.00	1.00	
Incremental Delay, d2	18.8	2.9		4.9	55.5		10.0	1.1		8.9	2.7	
Delay (s)	78.6	17.0		56.7	86.8		59.2	44.3		62.8	51.8	
Level of Service	E	B		E	F		E	D		E	D	
Approach Delay (s)		22.0			83.9			48.7			54.1	
Approach LOS		C			F			D			D	

Intersection Summary			
HCM Average Control Delay	60.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



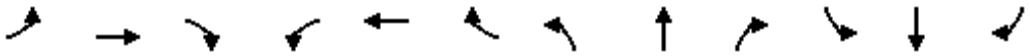
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	1162	13	27	2365	43	51	13	10	72	31	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	1.00			1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.98	
Satd. Flow (prot)	1770	5077		1770	5072			1791	1583		1717	
Flt Permitted	0.95	1.00		0.95	1.00			0.53	1.00		0.75	
Satd. Flow (perm)	1770	5077		1770	5072			982	1583		1307	
Peak-hour factor, PHF	0.92	0.92	0.92	0.81	0.81	0.81	0.56	0.56	0.56	0.87	0.87	0.87
Adj. Flow (vph)	48	1263	14	33	2920	53	91	23	18	83	36	97
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	15	0	27	0
Lane Group Flow (vph)	48	1276	0	33	2972	0	0	114	3	0	189	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)	7.8	78.0		4.8	75.0			21.9	21.9		21.9	
Effective Green, g (s)	8.8	79.0		5.8	76.0			23.2	23.2		23.2	
Actuated g/C Ratio	0.07	0.66		0.05	0.63			0.19	0.19		0.19	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.3	5.3		5.3	
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)	130	3342		86	3212			190	306		253	
v/s Ratio Prot	0.03	c0.25		0.02	c0.59							
v/s Ratio Perm								0.12	0.00		c0.14	
v/c Ratio	0.37	0.38		0.38	0.93			0.60	0.01		0.75	
Uniform Delay, d1	53.0	9.4		55.4	19.5			44.2	39.1		45.6	
Progression Factor	0.39	0.04		1.12	0.76			1.00	1.00		1.00	
Incremental Delay, d2	0.5	0.3		0.1	0.6			4.4	0.0		10.9	
Delay (s)	21.1	0.6		62.2	15.4			48.6	39.1		56.5	
Level of Service	C	A		E	B			D	D		E	
Approach Delay (s)		1.4			16.0			47.3			56.5	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



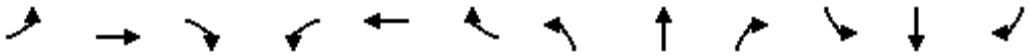
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	930	43	202	1707	41	165	364	24	126	401	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5052		1770	5067		1770	3506		1770	3515	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5052		1770	5067		1770	3506		1770	3515	
Peak-hour factor, PHF	0.79	0.79	0.79	0.91	0.91	0.91	0.87	0.87	0.87	0.90	0.90	0.90
Adj. Flow (vph)	87	1177	54	222	1876	45	190	418	28	140	446	21
RTOR Reduction (vph)	0	5	0	0	2	0	0	4	0	0	2	0
Lane Group Flow (vph)	87	1226	0	222	1919	0	190	442	0	140	465	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	9.7	39.2		26.4	55.9		13.8	21.7		10.5	18.4	
Effective Green, g (s)	10.9	40.4		27.6	57.1		15.7	23.6		12.4	20.3	
Actuated g/C Ratio	0.09	0.34		0.23	0.48		0.13	0.20		0.10	0.17	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	161	1701		407	2411		232	690		183	595	
v/s Ratio Prot	0.05	c0.24		0.13	c0.38		c0.11	c0.13		0.08	c0.13	
v/s Ratio Perm												
v/c Ratio	0.54	0.72		0.55	0.80		0.82	0.64		0.77	0.78	
Uniform Delay, d1	52.2	34.9		40.7	26.5		50.8	44.3		52.4	47.7	
Progression Factor	0.48	0.88		0.55	0.33		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	2.1		0.4	1.3		18.8	2.0		15.6	6.6	
Delay (s)	26.8	32.6		22.6	10.1		69.5	46.3		68.0	54.3	
Level of Service	C	C		C	B		E	D		E	D	
Approach Delay (s)		32.2			11.4			53.3			57.5	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM Average Control Delay	28.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



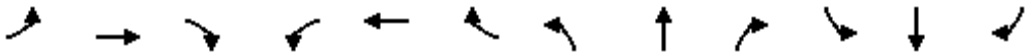
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	1019	135	192	1900	83	130	248	133	88	362	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4996		1770	5053		1770	3354		1770	3429	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4996		1770	5053		1770	3354		1770	3429	
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.88	0.88	0.88	0.89	0.89	0.89
Adj. Flow (vph)	71	1145	152	204	2021	88	148	282	151	99	407	107
RTOR Reduction (vph)	0	15	0	0	3	0	0	58	0	0	20	0
Lane Group Flow (vph)	71	1282	0	204	2106	0	148	375	0	99	494	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.2	41.8		24.2	58.8		12.6	20.9		10.7	19.0	
Effective Green, g (s)	8.5	43.1		25.5	60.1		14.5	22.8		12.6	20.9	
Actuated g/C Ratio	0.07	0.36		0.21	0.50		0.12	0.19		0.10	0.17	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	125	1794		376	2531		214	637		186	597	
v/s Ratio Prot	0.04	c0.26		0.12	c0.42		c0.08	0.11		0.06	c0.14	
v/s Ratio Perm												
v/c Ratio	0.57	0.71		0.54	0.83		0.69	0.59		0.53	0.83	
Uniform Delay, d1	54.0	33.2		42.1	25.6		50.6	44.3		50.9	47.8	
Progression Factor	1.00	1.00		0.65	0.48		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	2.5		0.6	2.4		7.5	1.4		1.5	9.2	
Delay (s)	57.5	35.6		28.1	14.8		58.2	45.7		52.4	57.0	
Level of Service	E	D		C	B		E	D		D	E	
Approach Delay (s)		36.8			16.0			48.9			56.3	
Approach LOS		D			B			D			E	

Intersection Summary			
HCM Average Control Delay	30.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



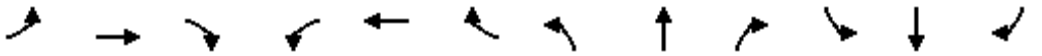
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1444	74	71	2535	0	99	0	80	3	4	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			5.9	4.0		4.0	
Lane Util. Factor		0.91		1.00	0.91			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.95	
Flt Protected		1.00		0.95	1.00			0.95	1.00		0.99	
Satd. Flow (prot)		5048		1770	5085			1770	1583		1739	
Flt Permitted		1.00		0.95	1.00			0.75	1.00		0.93	
Satd. Flow (perm)		5048		1770	5085			1393	1583		1638	
Peak-hour factor, PHF	0.88	0.88	0.88	0.91	0.91	0.91	0.92	0.92	0.92	0.84	0.84	0.84
Adj. Flow (vph)	0	1641	84	78	2786	0	108	0	87	4	5	6
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	75	0	4	0
Lane Group Flow (vph)	0	1721	0	78	2786	0	0	108	12	0	11	0
Turn Type				Prot			Perm		Perm	Perm		
Protected Phases		2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)		75.7		13.7	94.7			14.1	14.1		14.1	
Effective Green, g (s)		77.0		15.0	96.0			14.1	16.0		16.0	
Actuated g/C Ratio		0.64		0.12	0.80			0.12	0.13		0.13	
Clearance Time (s)		5.3		5.3	5.3			5.9	5.9		5.9	
Vehicle Extension (s)		3.0		2.5	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)		3239		221	4068			164	211		218	
v/s Ratio Prot		0.34		0.04	c0.55							
v/s Ratio Perm								c0.08	0.01		0.01	
v/c Ratio		0.53		0.35	0.68			0.66	0.05		0.05	
Uniform Delay, d1		11.7		48.1	5.3			50.6	45.4		45.4	
Progression Factor		1.05		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.4		0.7	1.0			8.2	0.1		0.1	
Delay (s)		12.7		48.8	6.3			58.9	45.5		45.4	
Level of Service		B		D	A			E	D		D	
Approach Delay (s)		12.7			7.4			52.9			45.4	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



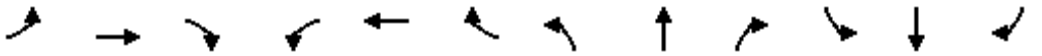
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1241	86	179	2357	281	99	527	99	188	658	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0	5.5	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.91		1.00	0.91	1.00	1.00	0.95		0.97	0.95	
Frt		0.99		1.00	1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		5036		1770	5085	1583	1770	3455		3433	3454	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		5036		1770	5085	1583	1770	3455		3433	3454	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.86	0.86	0.86	0.88	0.88	0.88
Adj. Flow (vph)	0	1379	96	199	2619	312	115	613	115	214	748	144
RTOR Reduction (vph)	0	6	0	0	0	107	0	14	0	0	13	0
Lane Group Flow (vph)	0	1469	0	199	2619	205	115	714	0	214	879	0
Turn Type	Perm			Prot		Perm	Prot			Prot		
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2					6						
Actuated Green, G (s)		43.7		15.3	64.5	64.5	8.4	28.4		10.6	30.6	
Effective Green, g (s)		45.2		16.8	66.0	64.5	9.9	29.9		12.1	32.1	
Actuated g/C Ratio		0.38		0.14	0.55	0.54	0.08	0.25		0.10	0.27	
Clearance Time (s)		5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		1897		248	2797	851	146	861		346	924	
v/s Ratio Prot		0.29		0.11	c0.52		0.06	c0.21		0.06	c0.25	
v/s Ratio Perm						0.13						
v/c Ratio		0.77		0.80	0.94	0.24	0.79	0.83		0.62	0.95	
Uniform Delay, d1		32.9		50.0	25.1	14.7	54.0	42.6		51.7	43.2	
Progression Factor		1.08		0.93	1.02	1.04	1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.5		12.9	6.1	0.5	22.3	6.7		2.3	18.8	
Delay (s)		38.1		59.4	31.6	15.9	76.3	49.3		54.1	62.0	
Level of Service		D		E	C	B	E	D		D	E	
Approach Delay (s)		38.1			31.8			53.0			60.4	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM Average Control Delay	40.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



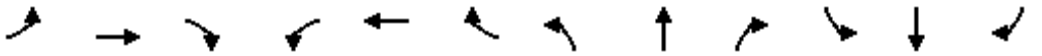
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	1054	152	259	2312	76	146	223	131	78	211	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	1.00		1.00	0.94		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4989		3433	5061		1770	3343		1770	3397	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4989		3433	5061		1770	3343		1770	3397	
Peak-hour factor, PHF	0.82	0.82	0.82	0.85	0.85	0.85	0.79	0.79	0.79	0.91	0.91	0.91
Adj. Flow (vph)	130	1285	185	305	2720	89	185	282	166	86	232	85
RTOR Reduction (vph)	0	15	0	0	3	0	0	71	0	0	32	0
Lane Group Flow (vph)	130	1455	0	305	2806	0	185	377	0	86	285	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	8.4	56.4		14.4	62.4		13.0	21.9		5.5	14.4	
Effective Green, g (s)	9.6	57.6		15.6	63.6		14.7	23.6		7.2	16.1	
Actuated g/C Ratio	0.08	0.48		0.13	0.53		0.12	0.20		0.06	0.13	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.7	5.7		5.7	5.7	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	142	2395		446	2682		217	657		106	456	
v/s Ratio Prot	c0.07	0.29		0.09	c0.55		c0.10	0.11		c0.05	c0.08	
v/s Ratio Perm												
v/c Ratio	0.92	0.61		0.68	1.05		0.85	0.57		0.81	0.62	
Uniform Delay, d1	54.8	22.9		49.8	28.2		51.6	43.6		55.7	49.1	
Progression Factor	1.25	0.22		1.20	0.65		1.00	1.00		1.00	1.00	
Incremental Delay, d2	49.5	1.1		1.9	26.6		25.9	1.2		35.0	2.7	
Delay (s)	118.2	6.1		61.9	44.8		77.5	44.9		90.8	51.8	
Level of Service	F	A		E	D		E	D		F	D	
Approach Delay (s)		15.2			46.4			54.4			60.1	
Approach LOS		B			D			D			E	

Intersection Summary			
HCM Average Control Delay	39.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



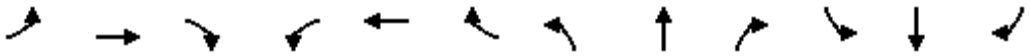
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	1162	13	27	2365	43	51	13	10	72	31	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	5.3
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	5077		1770	5072			1791	1583		1800	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.58	1.00		0.61	1.00
Satd. Flow (perm)	1770	5077		1770	5072			1072	1583		1143	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.81	0.81	0.81	0.56	0.56	0.56	0.87	0.87	0.87
Adj. Flow (vph)	48	1263	14	33	2920	53	91	23	18	83	36	97
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	15	0	0	64
Lane Group Flow (vph)	48	1276	0	33	2972	0	0	114	3	0	119	33
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8		8	4		4
Actuated Green, G (s)	5.0	83.2		3.9	82.1			17.6	17.6		17.6	17.6
Effective Green, g (s)	6.0	84.2		4.9	83.1			18.9	18.9		18.9	17.6
Actuated g/C Ratio	0.05	0.70		0.04	0.69			0.16	0.16		0.16	0.15
Clearance Time (s)	5.0	5.0		5.0	5.0			5.3	5.3		5.3	5.3
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	89	3562		72	3512			169	249		180	232
v/s Ratio Prot	c0.03	0.25		0.02	c0.59							
v/s Ratio Perm								c0.11	0.00		0.10	0.02
v/c Ratio	0.54	0.36		0.46	0.85			0.67	0.01		0.66	0.14
Uniform Delay, d1	55.7	7.1		56.3	13.7			47.7	42.7		47.5	44.6
Progression Factor	0.97	0.34		0.96	1.55			1.00	1.00		1.00	1.00
Incremental Delay, d2	2.6	0.2		0.2	0.3			9.3	0.0		7.9	0.2
Delay (s)	56.5	2.6		54.3	21.5			56.9	42.7		55.5	44.8
Level of Service	E	A		D	C			E	D		E	D
Approach Delay (s)		4.6			21.8			55.0			50.7	
Approach LOS		A			C			D			D	

Intersection Summary			
HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



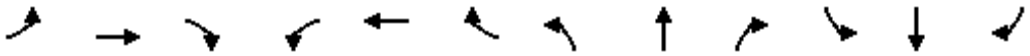
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	930	43	202	1707	41	165	364	24	126	401	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5052		1770	5067		1770	3506		1770	3515	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5052		1770	5067		1770	3506		1770	3515	
Peak-hour factor, PHF	0.79	0.79	0.79	0.91	0.91	0.91	0.87	0.87	0.87	0.90	0.90	0.90
Adj. Flow (vph)	87	1177	54	222	1876	45	190	418	28	140	446	21
RTOR Reduction (vph)	0	5	0	0	2	0	0	4	0	0	2	0
Lane Group Flow (vph)	87	1226	0	222	1919	0	190	442	0	140	465	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	9.7	39.2		26.4	55.9		13.8	21.7		10.5	18.4	
Effective Green, g (s)	10.9	40.4		27.6	57.1		15.7	23.6		12.4	20.3	
Actuated g/C Ratio	0.09	0.34		0.23	0.48		0.13	0.20		0.10	0.17	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	161	1701		407	2411		232	690		183	595	
v/s Ratio Prot	0.05	c0.24		0.13	c0.38		c0.11	c0.13		0.08	c0.13	
v/s Ratio Perm												
v/c Ratio	0.54	0.72		0.55	0.80		0.82	0.64		0.77	0.78	
Uniform Delay, d1	52.2	34.9		40.7	26.5		50.8	44.3		52.4	47.7	
Progression Factor	0.48	0.88		0.95	0.92		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	2.1		0.5	1.6		18.8	2.0		15.6	6.6	
Delay (s)	26.8	32.6		39.0	26.0		69.5	46.3		68.0	54.3	
Level of Service	C	C		D	C		E	D		E	D	
Approach Delay (s)		32.2			27.4			53.3			57.5	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM Average Control Delay	36.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	1019	135	192	1900	83	130	248	133	88	362	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4996		1770	5053		1770	3354		1770	3429	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4996		1770	5053		1770	3354		1770	3429	
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.88	0.88	0.88	0.89	0.89	0.89
Adj. Flow (vph)	71	1145	152	204	2021	88	148	282	151	99	407	107
RTOR Reduction (vph)	0	15	0	0	3	0	0	58	0	0	20	0
Lane Group Flow (vph)	71	1282	0	204	2106	0	148	375	0	99	494	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.2	41.8		24.2	58.8		12.6	20.9		10.7	19.0	
Effective Green, g (s)	8.5	43.1		25.5	60.1		14.5	22.8		12.6	20.9	
Actuated g/C Ratio	0.07	0.36		0.21	0.50		0.12	0.19		0.10	0.17	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	125	1794		376	2531		214	637		186	597	
v/s Ratio Prot	0.04	c0.26		0.12	c0.42		c0.08	0.11		0.06	c0.14	
v/s Ratio Perm												
v/c Ratio	0.57	0.71		0.54	0.83		0.69	0.59		0.53	0.83	
Uniform Delay, d1	54.0	33.2		42.1	25.6		50.6	44.3		50.9	47.8	
Progression Factor	1.00	1.00		0.65	0.50		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	2.5		0.6	2.4		7.5	1.4		1.5	9.2	
Delay (s)	57.5	35.6		28.1	15.1		58.2	45.7		52.4	57.0	
Level of Service	E	D		C	B		E	D		D	E	
Approach Delay (s)		36.8			16.3			48.9			56.3	
Approach LOS		D			B			D			E	

Intersection Summary			
HCM Average Control Delay	30.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1444	74	71	2535	0	99	0	80	3	4	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			5.9	4.0		4.0	
Lane Util. Factor		0.91		1.00	0.91			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.94	
Flt Protected		1.00		0.95	1.00			0.95	1.00		0.99	
Satd. Flow (prot)		5048		1770	5085			1770	1583		1739	
Flt Permitted		1.00		0.95	1.00			0.75	1.00		0.94	
Satd. Flow (perm)		5048		1770	5085			1390	1583		1649	
Peak-hour factor, PHF	0.88	0.88	0.88	0.91	0.91	0.91	0.92	0.92	0.92	0.84	0.84	0.84
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	0	1920	98	91	3259	0	126	0	102	4	6	7
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	87	0	2	0
Lane Group Flow (vph)	0	2014	0	91	3259	0	0	126	15	0	15	0
Turn Type				Prot			Perm		Perm	Perm		
Protected Phases		2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)		72.4		15.4	93.1			15.7	15.7		15.7	
Effective Green, g (s)		73.7		16.7	94.4			15.7	17.6		17.6	
Actuated g/C Ratio		0.61		0.14	0.79			0.13	0.15		0.15	
Clearance Time (s)		5.3		5.3	5.3			5.9	5.9		5.9	
Vehicle Extension (s)		3.0		2.5	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)		3100		246	4000			182	232		242	
v/s Ratio Prot		0.40		0.05	c0.64							
v/s Ratio Perm								c0.09	0.01		0.01	
v/c Ratio		0.65		0.37	0.81			0.69	0.06		0.06	
Uniform Delay, d1		14.9		46.9	7.6			49.8	44.1		44.1	
Progression Factor		1.21		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.4		0.7	1.9			10.0	0.1		0.1	
Delay (s)		18.5		47.6	9.5			59.8	44.2		44.2	
Level of Service		B		D	A			E	D		D	
Approach Delay (s)		18.5			10.6			52.8			44.2	
Approach LOS		B			B			D			D	

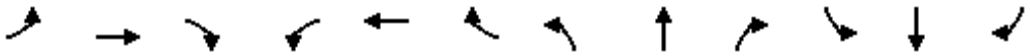
Intersection Summary			
HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1241	86	179	2357	281	99	527	99	188	658	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	5.5
Lane Util. Factor		0.91		1.00	0.91		1.00	0.95		1.00	0.95	1.00
Frt		0.99		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		5036		1770	5004		1770	3455		1770	3539	1583
Flt Permitted		1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		5036		1770	5004		1770	3455		1770	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.86	0.86	0.86	0.88	0.88	0.88
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	0	1613	112	233	3064	365	135	717	135	250	875	169
RTOR Reduction (vph)	0	7	0	0	12	0	0	13	0	0	0	11
Lane Group Flow (vph)	0	1718	0	233	3417	0	135	839	0	250	875	158
Turn Type	Perm			Prot			Prot			Prot		Perm
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2											4
Actuated Green, G (s)		46.3		15.7	67.5		8.1	23.5		12.5	27.9	27.9
Effective Green, g (s)		47.8		17.2	69.0		9.6	25.0		14.0	29.4	27.9
Actuated g/C Ratio		0.40		0.14	0.57		0.08	0.21		0.12	0.24	0.23
Clearance Time (s)		5.5		5.5	5.5		5.5	5.5		5.5	5.5	5.5
Vehicle Extension (s)		3.0		2.0	3.0		2.0	3.0		2.0	3.0	3.0
Lane Grp Cap (vph)		2006		254	2877		142	720		207	867	368
v/s Ratio Prot		0.34		0.13	c0.68		0.08	c0.24		c0.14	0.25	
v/s Ratio Perm												0.10
v/c Ratio		0.86		0.92	1.19		0.95	1.17		1.21	1.01	0.43
Uniform Delay, d1		33.0		50.7	25.5		55.0	47.5		53.0	45.3	39.3
Progression Factor		0.84		0.97	0.86		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		2.0		25.5	86.9		60.0	89.3		129.9	32.9	0.8
Delay (s)		29.8		74.5	108.8		115.0	136.8		182.9	78.2	40.1
Level of Service		C		E	F		F	F		F	E	D
Approach Delay (s)		29.8			106.6			133.8			93.4	
Approach LOS		C			F			F			F	

Intersection Summary			
HCM Average Control Delay	90.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	115.2%	ICU Level of Service	H
Analysis Period (min)	15		

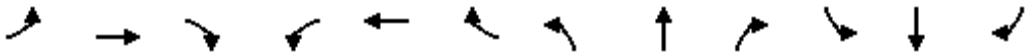
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	1054	152	259	2262	76	172	223	131	78	211	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	1.00		1.00	0.94		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4989		1770	5060		1770	3343		1770	3384	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4989		1770	5060		1770	3343		1770	3384	
Peak-hour factor, PHF	0.82	0.82	0.82	0.85	0.85	0.85	0.79	0.79	0.79	0.91	0.91	0.91
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	153	1504	217	357	3114	105	255	330	194	100	271	112
RTOR Reduction (vph)	0	15	0	0	3	0	0	71	0	0	38	0
Lane Group Flow (vph)	153	1706	0	357	3216	0	255	453	0	100	345	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	9.8	41.5		26.1	57.8		15.2	21.7		8.9	15.4	
Effective Green, g (s)	11.0	42.7		27.3	59.0		16.9	23.4		10.6	17.1	
Actuated g/C Ratio	0.09	0.36		0.23	0.49		0.14	0.19		0.09	0.14	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.7	5.7		5.7	5.7	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	162	1775		403	2488		249	652		156	482	
v/s Ratio Prot	0.09	0.34		c0.20	c0.64		c0.14	0.14		0.06	c0.10	
v/s Ratio Perm												
v/c Ratio	0.94	0.96		0.89	1.29		1.02	0.70		0.64	0.72	
Uniform Delay, d1	54.2	37.8		44.8	30.5		51.6	45.0		52.9	49.1	
Progression Factor	1.12	0.59		1.14	1.08		1.00	1.00		1.00	1.00	
Incremental Delay, d2	51.8	13.3		2.4	132.0		63.4	3.2		7.7	5.0	
Delay (s)	112.5	35.6		53.3	164.9		114.9	48.2		60.6	54.2	
Level of Service	F	D		D	F		F	D		E	D	
Approach Delay (s)		41.9			153.7			70.0			55.5	
Approach LOS		D			F			E			E	

Intersection Summary			
HCM Average Control Delay	105.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

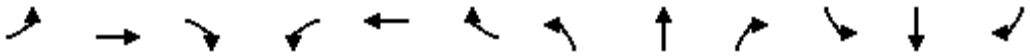
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	1162	13	27	2365	43	51	13	10	72	31	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	1.00			1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.98	
Satd. Flow (prot)	1770	5077		1770	5072			1791	1583		1717	
Flt Permitted	0.95	1.00		0.95	1.00			0.52	1.00		0.73	
Satd. Flow (perm)	1770	5077		1770	5072			976	1583		1271	
Peak-hour factor, PHF	0.92	0.92	0.92	0.81	0.81	0.81	0.56	0.56	0.56	0.87	0.87	0.87
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	56	1478	17	39	3416	62	107	27	21	97	42	113
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	16	0	25	0
Lane Group Flow (vph)	56	1494	0	39	3477	0	0	134	5	0	227	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)	8.3	73.4		5.1	70.2			26.2	26.2		26.2	
Effective Green, g (s)	9.3	74.4		6.1	71.2			27.5	27.5		27.5	
Actuated g/C Ratio	0.08	0.62		0.05	0.59			0.23	0.23		0.23	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.3	5.3		5.3	
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)	137	3148		90	3009			224	363		291	
v/s Ratio Prot	0.03	c0.29		0.02	c0.69							
v/s Ratio Perm								0.14	0.00		c0.18	
v/c Ratio	0.41	0.47		0.43	1.16			0.60	0.01		0.78	
Uniform Delay, d1	52.7	12.3		55.3	24.4			41.3	35.8		43.4	
Progression Factor	0.36	0.09		1.03	0.85			1.00	1.00		1.00	
Incremental Delay, d2	0.5	0.4		0.1	70.4			3.6	0.0		11.9	
Delay (s)	19.3	1.5		57.2	91.0			44.9	35.8		55.3	
Level of Service	B	A		E	F			D	D		E	
Approach Delay (s)		2.2			90.7			43.6			55.3	
Approach LOS		A			F			D			E	

Intersection Summary			
HCM Average Control Delay	62.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

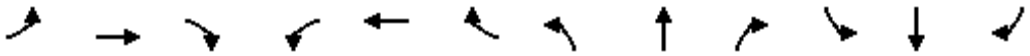
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	930	43	202	1707	41	165	364	24	126	401	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5051		1770	5067		1770	3507		1770	3515	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5051		1770	5067		1770	3507		1770	3515	
Peak-hour factor, PHF	0.79	0.79	0.79	0.91	0.91	0.91	0.87	0.87	0.87	0.90	0.90	0.90
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	102	1377	64	260	2195	53	222	490	32	164	521	25
RTOR Reduction (vph)	0	5	0	0	2	0	0	4	0	0	2	0
Lane Group Flow (vph)	102	1436	0	260	2246	0	222	518	0	164	544	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	10.1	44.1		24.7	58.7		9.9	19.1		9.9	19.1	
Effective Green, g (s)	11.3	45.3		25.9	59.9		11.8	21.0		11.8	21.0	
Actuated g/C Ratio	0.09	0.38		0.22	0.50		0.10	0.18		0.10	0.18	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	167	1907		382	2529		174	614		174	615	
v/s Ratio Prot	0.06	c0.28		0.15	c0.44		c0.13	0.15		0.09	c0.15	
v/s Ratio Perm												
v/c Ratio	0.61	0.75		0.68	0.89		1.28	0.84		0.94	0.88	
Uniform Delay, d1	52.2	32.5		43.2	27.0		54.1	47.9		53.8	48.3	
Progression Factor	0.53	0.89		0.59	0.36		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	1.8		0.4	0.5		161.0	10.3		51.0	14.2	
Delay (s)	30.9	30.5		26.0	10.3		215.1	58.2		104.7	62.5	
Level of Service	C	C		C	B		F	E		F	E	
Approach Delay (s)		30.6			11.9			105.0			72.2	
Approach LOS		C			B			F			E	

Intersection Summary			
HCM Average Control Delay	37.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.8%	ICU Level of Service	D
Analysis Period (min)	15		

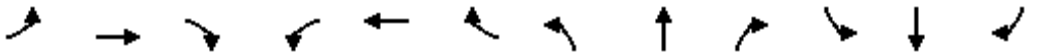
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	1019	135	192	1900	83	130	248	133	88	362	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4996		1770	5053		1770	3354		1770	3429	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4996		1770	5053		1770	3354		1770	3429	
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.88	0.88	0.88	0.89	0.89	0.89
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	83	1340	177	239	2365	103	173	330	177	116	476	125
RTOR Reduction (vph)	0	15	0	0	4	0	0	58	0	0	20	0
Lane Group Flow (vph)	83	1502	0	239	2464	0	173	449	0	116	581	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.5	41.8		22.6	56.9		13.3	21.7		11.5	19.9	
Effective Green, g (s)	8.8	43.1		23.9	58.2		15.2	23.6		13.4	21.8	
Actuated g/C Ratio	0.07	0.36		0.20	0.49		0.13	0.20		0.11	0.18	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	130	1794		353	2451		224	660		198	623	
v/s Ratio Prot	0.05	c0.30		0.14	c0.49		c0.10	0.13		0.07	c0.17	
v/s Ratio Perm												
v/c Ratio	0.64	0.84		0.68	1.01		0.77	0.68		0.59	0.93	
Uniform Delay, d1	54.1	35.2		44.5	30.9		50.7	44.7		50.7	48.4	
Progression Factor	1.00	1.00		0.68	0.52		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.3	4.8		2.2	14.6		13.9	2.9		2.8	21.1	
Delay (s)	61.4	40.1		32.5	30.6		64.6	47.6		53.5	69.4	
Level of Service	E	D		C	C		E	D		D	E	
Approach Delay (s)		41.2			30.7			51.9			66.9	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM Average Control Delay	40.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

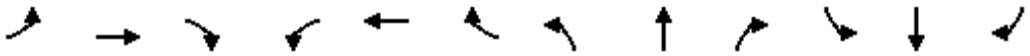
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1444	74	71	2535	0	99	0	80	3	4	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			5.9	4.0		4.0	
Lane Util. Factor		0.91		1.00	0.91			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.94	
Flt Protected		1.00		0.95	1.00			0.95	1.00		0.99	
Satd. Flow (prot)		5048		1770	5085			1770	1583		1739	
Flt Permitted		1.00		0.95	1.00			0.75	1.00		0.94	
Satd. Flow (perm)		5048		1770	5085			1390	1583		1647	
Peak-hour factor, PHF	0.88	0.88	0.88	0.91	0.91	0.91	0.92	0.92	0.92	0.84	0.84	0.84
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	0	1920	98	91	3259	0	126	0	102	4	6	7
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	87	0	2	0
Lane Group Flow (vph)	0	2013	0	91	3259	0	0	126	15	0	15	0
Turn Type				Prot			Perm		Perm	Perm		
Protected Phases		2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)		72.8		15.5	93.6			15.2	15.2		15.2	
Effective Green, g (s)		74.1		16.8	94.9			15.2	17.1		17.1	
Actuated g/C Ratio		0.62		0.14	0.79			0.13	0.14		0.14	
Clearance Time (s)		5.3		5.3	5.3			5.9	5.9		5.9	
Vehicle Extension (s)		3.0		2.5	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)		3117		248	4021			176	226		235	
v/s Ratio Prot		0.40		0.05	c0.64							
v/s Ratio Perm								c0.09	0.01		0.01	
v/c Ratio		0.65		0.37	0.81			0.72	0.06		0.07	
Uniform Delay, d1		14.6		46.8	7.3			50.3	44.5		44.5	
Progression Factor		1.47		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.5		0.7	1.9			12.1	0.1		0.1	
Delay (s)		22.0		47.5	9.2			62.5	44.6		44.6	
Level of Service		C		D	A			E	D		D	
Approach Delay (s)		22.0			10.2			54.5			44.6	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

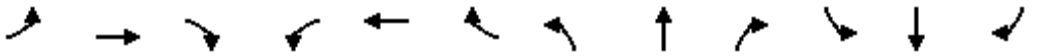
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1241	86	179	2357	281	99	527	99	188	658	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0	5.5	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.91		1.00	0.91	1.00	1.00	0.91		0.97	0.95	
Frt		0.99		1.00	1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		5036		1770	5085	1583	1770	4964		3433	3453	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		5036		1770	5085	1583	1770	4964		3433	3453	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.86	0.86	0.86	0.88	0.88	0.88
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	0	1613	112	233	3064	365	135	717	135	250	875	169
RTOR Reduction (vph)	0	6	0	0	0	107	0	24	0	0	9	0
Lane Group Flow (vph)	0	1719	0	233	3064	258	135	828	0	250	1035	0
Turn Type	Perm			Prot		Perm	Prot			Prot		
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2					6						
Actuated Green, G (s)		44.2		15.8	65.5	65.5	7.5	24.4		13.6	30.5	
Effective Green, g (s)		45.7		17.3	67.0	65.5	9.0	25.9		15.1	32.0	
Actuated g/C Ratio		0.38		0.14	0.56	0.55	0.08	0.22		0.13	0.27	
Clearance Time (s)		5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		1918		255	2839	864	133	1071		432	921	
v/s Ratio Prot		0.34		0.13	c0.60		c0.08	0.17		0.07	c0.30	
v/s Ratio Perm						0.16						
v/c Ratio		0.90		0.91	1.08	0.30	1.02	0.77		0.58	1.12	
Uniform Delay, d1		34.9		50.6	26.5	14.8	55.5	44.3		49.5	44.0	
Progression Factor		1.45		0.98	0.85	0.43	1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.0		24.9	40.6	0.6	82.1	3.5		1.2	69.9	
Delay (s)		55.6		74.7	63.2	6.9	137.6	47.8		50.6	113.9	
Level of Service		E		E	E	A	F	D		D	F	
Approach Delay (s)		55.6			58.3			60.1			101.7	
Approach LOS		E			E			E			F	

Intersection Summary			
HCM Average Control Delay	65.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	107.4%	ICU Level of Service	G
Analysis Period (min)	15		

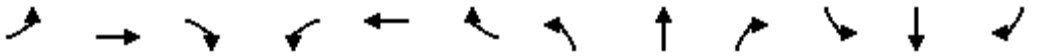
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	1054	152	259	2262	76	172	223	131	78	211	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		0.97	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	1.00		1.00	0.94		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4989		3433	5060		1770	3343		1770	3384	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4989		3433	5060		1770	3343		1770	3384	
Peak-hour factor, PHF	0.82	0.82	0.82	0.85	0.85	0.85	0.79	0.79	0.79	0.91	0.91	0.91
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	153	1504	217	357	3114	105	255	330	194	100	271	112
RTOR Reduction (vph)	0	16	0	0	3	0	0	71	0	0	37	0
Lane Group Flow (vph)	153	1705	0	357	3216	0	255	453	0	100	346	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.8	57.8		15.8	65.8		14.3	18.3		6.3	10.3	
Effective Green, g (s)	9.0	59.0		17.0	67.0		16.0	20.0		8.0	12.0	
Actuated g/C Ratio	0.08	0.49		0.14	0.56		0.13	0.17		0.07	0.10	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.7	5.7		5.7	5.7	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	133	2453		486	2825		236	557		118	338	
v/s Ratio Prot	c0.09	0.34		0.10	c0.64		c0.14	c0.14		0.06	c0.10	
v/s Ratio Perm												
v/c Ratio	1.15	0.70		0.73	1.14		1.08	0.81		0.85	1.02	
Uniform Delay, d1	55.5	23.6		49.3	26.5		52.0	48.2		55.4	54.0	
Progression Factor	0.52	1.25		1.26	1.50		1.00	1.00		1.00	1.00	
Incremental Delay, d2	122.1	1.6		0.5	62.7		81.6	8.9		39.9	55.2	
Delay (s)	151.2	31.1		62.9	102.6		133.6	57.1		95.3	109.2	
Level of Service	F	C		E	F		F	E		F	F	
Approach Delay (s)		40.9			98.6			82.1			106.3	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM Average Control Delay	81.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

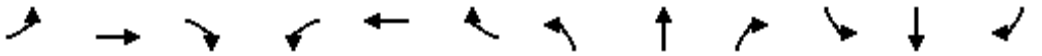
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	1162	13	27	2365	43	51	13	10	72	31	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	5.3
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	5077		1770	5072			1791	1583		1800	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.54	1.00		0.58	1.00
Satd. Flow (perm)	1770	5077		1770	5072			1006	1583		1073	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.81	0.81	0.81	0.56	0.56	0.56	0.87	0.87	0.87
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	56	1478	17	39	3416	62	107	27	21	97	42	113
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	17	0	0	62
Lane Group Flow (vph)	56	1494	0	39	3477	0	0	134	4	0	139	51
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8		8	4		4
Actuated Green, G (s)	5.0	81.0		4.0	80.0			19.7	19.7		19.7	19.7
Effective Green, g (s)	6.0	82.0		5.0	81.0			21.0	21.0		21.0	19.7
Actuated g/C Ratio	0.05	0.68		0.04	0.68			0.18	0.18		0.18	0.16
Clearance Time (s)	5.0	5.0		5.0	5.0			5.3	5.3		5.3	5.3
Vehicle Extension (s)	2.0	3.0		2.0	3.0			2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	89	3469		74	3424			176	277		188	260
v/s Ratio Prot	c0.03	0.29		0.02	c0.69							
v/s Ratio Perm								c0.13	0.00		0.13	0.03
v/c Ratio	0.63	0.43		0.53	1.02			0.76	0.01		0.74	0.20
Uniform Delay, d1	55.9	8.5		56.3	19.5			47.1	40.9		46.9	43.3
Progression Factor	0.91	0.25		0.99	0.87			1.00	1.00		1.00	1.00
Incremental Delay, d2	7.4	0.3		0.3	9.3			16.8	0.0		13.4	0.3
Delay (s)	58.1	2.5		56.2	26.3			63.9	40.9		60.3	43.6
Level of Service	E	A		E	C			E	D		E	D
Approach Delay (s)		4.5			26.6			60.8			52.8	
Approach LOS		A			C			E			D	

Intersection Summary			
HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

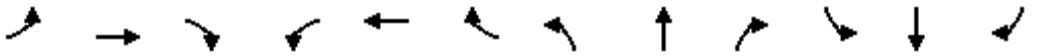
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	930	43	202	1707	41	165	364	24	126	401	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5051		1770	5067		1770	3507		1770	3515	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5051		1770	5067		1770	3507		1770	3515	
Peak-hour factor, PHF	0.79	0.79	0.79	0.91	0.91	0.91	0.87	0.87	0.87	0.90	0.90	0.90
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	102	1377	64	260	2195	53	222	490	32	164	521	25
RTOR Reduction (vph)	0	5	0	0	2	0	0	4	0	0	2	0
Lane Group Flow (vph)	102	1436	0	260	2246	0	222	518	0	164	544	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	10.1	44.1		24.7	58.7		9.9	19.1		9.9	19.1	
Effective Green, g (s)	11.3	45.3		25.9	59.9		11.8	21.0		11.8	21.0	
Actuated g/C Ratio	0.09	0.38		0.22	0.50		0.10	0.18		0.10	0.18	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	167	1907		382	2529		174	614		174	615	
v/s Ratio Prot	0.06	c0.28		0.15	c0.44		c0.13	0.15		0.09	c0.15	
v/s Ratio Perm												
v/c Ratio	0.61	0.75		0.68	0.89		1.28	0.84		0.94	0.88	
Uniform Delay, d1	52.2	32.5		43.2	27.0		54.1	47.9		53.8	48.3	
Progression Factor	0.53	0.89		1.05	1.11		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	1.8		1.2	1.7		161.0	10.3		51.0	14.2	
Delay (s)	30.9	30.5		46.8	31.7		215.1	58.2		104.7	62.5	
Level of Service	C	C		D	C		F	E		F	E	
Approach Delay (s)		30.6			33.3			105.0			72.2	
Approach LOS		C			C			F			E	

Intersection Summary			
HCM Average Control Delay	47.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.8%	ICU Level of Service	D
Analysis Period (min)	15		

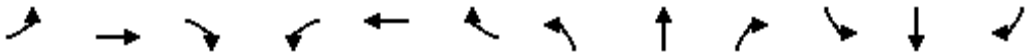
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	1019	135	192	1900	83	130	248	133	88	362	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4996		1770	5053		1770	3354		1770	3429	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4996		1770	5053		1770	3354		1770	3429	
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.88	0.88	0.88	0.89	0.89	0.89
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	83	1340	177	239	2365	103	173	330	177	116	476	125
RTOR Reduction (vph)	0	15	0	0	4	0	0	58	0	0	20	0
Lane Group Flow (vph)	83	1502	0	239	2464	0	173	449	0	116	581	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.5	41.8		22.6	56.9		13.3	21.7		11.5	19.9	
Effective Green, g (s)	8.8	43.1		23.9	58.2		15.2	23.6		13.4	21.8	
Actuated g/C Ratio	0.07	0.36		0.20	0.49		0.13	0.20		0.11	0.18	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	130	1794		353	2451		224	660		198	623	
v/s Ratio Prot	0.05	c0.30		0.14	c0.49		c0.10	0.13		0.07	c0.17	
v/s Ratio Perm												
v/c Ratio	0.64	0.84		0.68	1.01		0.77	0.68		0.59	0.93	
Uniform Delay, d1	54.1	35.2		44.5	30.9		50.7	44.7		50.7	48.4	
Progression Factor	1.00	1.00		0.65	0.47		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.3	4.8		2.2	14.6		13.9	2.9		2.8	21.1	
Delay (s)	61.4	40.1		31.3	29.1		64.6	47.6		53.5	69.4	
Level of Service	E	D		C	C		E	D		D	E	
Approach Delay (s)		41.2			29.2			51.9			66.9	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM Average Control Delay	40.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

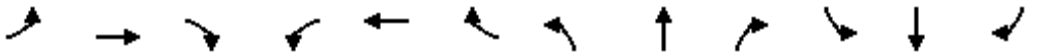
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1444	74	71	2535	0	99	0	80	3	4	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			5.9	4.0		4.0	
Lane Util. Factor		0.91		1.00	0.86			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.94	
Flt Protected		1.00		0.95	1.00			0.95	1.00		0.99	
Satd. Flow (prot)		5048		1770	6408			1770	1583		1739	
Flt Permitted		1.00		0.95	1.00			0.75	1.00		0.94	
Satd. Flow (perm)		5048		1770	6408			1390	1583		1649	
Peak-hour factor, PHF	0.88	0.88	0.88	0.91	0.91	0.91	0.92	0.92	0.92	0.84	0.84	0.84
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	0	1920	98	91	3259	0	126	0	102	4	6	7
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	87	0	2	0
Lane Group Flow (vph)	0	2014	0	91	3259	0	0	126	15	0	15	0
Turn Type				Prot			Perm		Perm	Perm		
Protected Phases		2		1	6			8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)		73.7		14.1	93.1			15.7	15.7		15.7	
Effective Green, g (s)		75.0		15.4	94.4			15.7	17.6		17.6	
Actuated g/C Ratio		0.62		0.13	0.79			0.13	0.15		0.15	
Clearance Time (s)		5.3		5.3	5.3			5.9	5.9		5.9	
Vehicle Extension (s)		3.0		2.5	3.0			2.5	2.5		2.5	
Lane Grp Cap (vph)		3155		227	5041			182	232		242	
v/s Ratio Prot		0.40		0.05	c0.51							
v/s Ratio Perm								c0.09	0.01		0.01	
v/c Ratio		0.64		0.40	0.65			0.69	0.06		0.06	
Uniform Delay, d1		14.0		48.1	5.6			49.8	44.1		44.1	
Progression Factor		1.29		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.5		0.8	0.7			10.0	0.1		0.1	
Delay (s)		18.5		48.9	6.2			59.8	44.2		44.2	
Level of Service		B		D	A			E	D		D	
Approach Delay (s)		18.5			7.4			52.8			44.2	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.9
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		

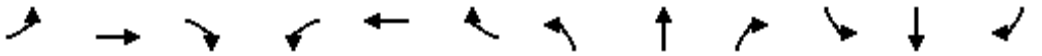
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1241	86	179	2357	281	99	527	99	188	658	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0	5.5	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.91		1.00	0.86	1.00	1.00	0.91		0.97	0.95	
Frt		0.99		1.00	1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		5036		1770	6408	1583	1770	4964		3433	3453	
Flt Permitted		1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		5036		1770	6408	1583	1770	4964		3433	3453	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.86	0.86	0.86	0.88	0.88	0.88
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	0	1613	112	233	3064	365	135	717	135	250	875	169
RTOR Reduction (vph)	0	6	0	0	0	135	0	24	0	0	13	0
Lane Group Flow (vph)	0	1719	0	233	3064	230	135	828	0	250	1031	0
Turn Type	Perm			Prot		Perm	Prot			Prot		
Protected Phases		2		1	6		3	8		7	4	
Permitted Phases	2					6						
Actuated Green, G (s)		40.7		15.1	61.3	61.3	8.7	25.8		16.4	33.5	
Effective Green, g (s)		42.2		16.6	62.8	61.3	10.2	27.3		17.9	35.0	
Actuated g/C Ratio		0.35		0.14	0.52	0.51	0.08	0.23		0.15	0.29	
Clearance Time (s)		5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		3.0		2.0	3.0	3.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		1771		245	3354	809	150	1129		512	1007	
v/s Ratio Prot		c0.34		0.13	c0.48		c0.08	0.17		0.07	c0.30	
v/s Ratio Perm						0.15						
v/c Ratio		0.97		0.95	0.91	0.28	0.90	0.73		0.49	1.02	
Uniform Delay, d1		38.3		51.3	26.1	16.8	54.4	43.0		46.8	42.5	
Progression Factor		1.44		0.92	0.94	0.81	1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.3		38.4	4.2	0.7	44.5	2.5		0.3	34.6	
Delay (s)		65.3		85.5	28.7	14.2	98.9	45.5		47.1	77.1	
Level of Service		E		F	C	B	F	D		D	E	
Approach Delay (s)		65.3			30.9			52.8			71.3	
Approach LOS		E			C			D			E	

Intersection Summary			
HCM Average Control Delay	48.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.1%	ICU Level of Service	F
Analysis Period (min)	15		

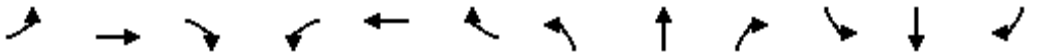
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	1054	152	259	2262	76	172	223	131	78	211	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.86		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	1.00		1.00	0.94		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4989		1770	6376		1770	3343		1770	3384	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4989		1770	6376		1770	3343		1770	3384	
Peak-hour factor, PHF	0.82	0.82	0.82	0.85	0.85	0.85	0.79	0.79	0.79	0.91	0.91	0.91
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	153	1504	217	357	3114	105	255	330	194	100	271	112
RTOR Reduction (vph)	0	16	0	0	4	0	0	70	0	0	37	0
Lane Group Flow (vph)	153	1705	0	357	3215	0	255	454	0	100	346	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	9.8	48.8		22.8	61.8		14.3	17.6		9.0	12.3	
Effective Green, g (s)	11.0	50.0		24.0	63.0		16.0	19.3		10.7	14.0	
Actuated g/C Ratio	0.09	0.42		0.20	0.52		0.13	0.16		0.09	0.12	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.7	5.7		5.7	5.7	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	162	2079		354	3347		236	538		158	395	
v/s Ratio Prot	c0.09	0.34		0.20	c0.50		c0.14	c0.14		0.06	c0.10	
v/s Ratio Perm												
v/c Ratio	0.94	0.82		1.01	0.96		1.08	0.84		0.63	0.88	
Uniform Delay, d1	54.2	31.0		48.0	27.3		52.0	48.9		52.8	52.1	
Progression Factor	0.51	1.07		1.28	1.49		1.00	1.00		1.00	1.00	
Incremental Delay, d2	52.4	3.6		35.0	4.9		81.6	11.5		8.0	19.0	
Delay (s)	79.9	36.8		96.3	45.5		133.6	60.4		60.8	71.1	
Level of Service	E	D		F	D		F	E		E	E	
Approach Delay (s)		40.3			50.5			84.4			69.0	
Approach LOS		D			D			F			E	

Intersection Summary			
HCM Average Control Delay	52.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

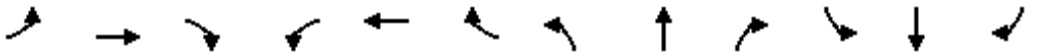
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	1162	13	27	2365	43	51	13	10	72	31	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	5.0		4.0	4.0		4.0	5.3
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	5077		1770	5085	1583		1791	1583		1800	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.54	1.00		0.58	1.00
Satd. Flow (perm)	1770	5077		1770	5085	1583		1006	1583		1073	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.81	0.81	0.81	0.56	0.56	0.56	0.87	0.87	0.87
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	56	1478	17	39	3416	62	107	27	21	97	42	113
RTOR Reduction (vph)	0	1	0	0	0	14	0	0	17	0	0	61
Lane Group Flow (vph)	56	1494	0	39	3416	48	0	134	4	0	139	52
Turn Type	Prot			Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8		8	4		4
Actuated Green, G (s)	5.0	81.5		3.5	80.0	80.0		19.7	19.7		19.7	19.7
Effective Green, g (s)	6.0	82.5		4.5	81.0	80.0		21.0	21.0		21.0	19.7
Actuated g/C Ratio	0.05	0.69		0.04	0.68	0.67		0.18	0.18		0.18	0.16
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.3	5.3		5.3	5.3
Vehicle Extension (s)	2.0	3.0		2.0	3.0	3.0		2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	89	3490		66	3432	1055		176	277		188	260
v/s Ratio Prot	c0.03	0.29		0.02	c0.67							
v/s Ratio Perm						0.03		c0.13	0.00		0.13	0.03
v/c Ratio	0.63	0.43		0.59	1.00	0.05		0.76	0.01		0.74	0.20
Uniform Delay, d1	55.9	8.3		56.8	19.3	6.9		47.1	40.9		46.9	43.3
Progression Factor	0.93	0.27		1.03	1.01	1.32		1.00	1.00		1.00	1.00
Incremental Delay, d2	7.4	0.3		2.9	7.5	0.0		16.8	0.0		13.4	0.3
Delay (s)	59.4	2.6		61.2	27.0	9.1		63.9	40.9		60.3	43.6
Level of Service	E	A		E	C	A		E	D		E	D
Approach Delay (s)		4.6			27.1			60.8			52.8	
Approach LOS		A			C			E			D	

Intersection Summary			
HCM Average Control Delay	22.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		

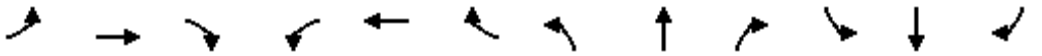
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	930	43	202	1707	41	165	364	24	126	401	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5051		1770	5067		1770	3507		1770	3515	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5051		1770	5067		1770	3507		1770	3515	
Peak-hour factor, PHF	0.79	0.79	0.79	0.91	0.91	0.91	0.87	0.87	0.87	0.90	0.90	0.90
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	102	1377	64	260	2195	53	222	490	32	164	521	25
RTOR Reduction (vph)	0	5	0	0	2	0	0	4	0	0	2	0
Lane Group Flow (vph)	102	1436	0	260	2246	0	222	518	0	164	544	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	10.1	44.1		24.7	58.7		9.9	19.1		9.9	19.1	
Effective Green, g (s)	11.3	45.3		25.9	59.9		11.8	21.0		11.8	21.0	
Actuated g/C Ratio	0.09	0.38		0.22	0.50		0.10	0.18		0.10	0.18	
Clearance Time (s)	5.2	5.2		5.2	5.2		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	167	1907		382	2529		174	614		174	615	
v/s Ratio Prot	0.06	c0.28		0.15	c0.44		c0.13	0.15		0.09	c0.15	
v/s Ratio Perm												
v/c Ratio	0.61	0.75		0.68	0.89		1.28	0.84		0.94	0.88	
Uniform Delay, d1	52.2	32.5		43.2	27.0		54.1	47.9		53.8	48.3	
Progression Factor	0.53	0.89		1.08	1.15		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	1.8		1.4	1.9		161.0	10.3		51.0	14.2	
Delay (s)	30.9	30.5		47.9	33.0		215.1	58.2		104.7	62.5	
Level of Service	C	C		D	C		F	E		F	E	
Approach Delay (s)		30.6			34.5			105.0			72.2	
Approach LOS		C			C			F			E	

Intersection Summary			
HCM Average Control Delay	47.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	1019	135	192	1900	83	130	248	133	88	362	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	4996		1770	5053		1770	3354		1770	3429	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	4996		1770	5053		1770	3354		1770	3429	
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.88	0.88	0.88	0.89	0.89	0.89
Growth Factor (vph)	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	83	1340	177	239	2365	103	173	330	177	116	476	125
RTOR Reduction (vph)	0	15	0	0	4	0	0	58	0	0	20	0
Lane Group Flow (vph)	83	1502	0	239	2464	0	173	449	0	116	581	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.5	41.8		22.6	56.9		13.3	21.7		11.5	19.9	
Effective Green, g (s)	8.8	43.1		23.9	58.2		15.2	23.6		13.4	21.8	
Actuated g/C Ratio	0.07	0.36		0.20	0.49		0.13	0.20		0.11	0.18	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	130	1794		353	2451		224	660		198	623	
v/s Ratio Prot	0.05	c0.30		0.14	c0.49		c0.10	0.13		0.07	c0.17	
v/s Ratio Perm												
v/c Ratio	0.64	0.84		0.68	1.01		0.77	0.68		0.59	0.93	
Uniform Delay, d1	54.1	35.2		44.5	30.9		50.7	44.7		50.7	48.4	
Progression Factor	1.00	1.00		0.65	0.47		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.3	4.8		2.2	14.6		13.9	2.9		2.8	21.1	
Delay (s)	61.4	40.1		31.3	29.1		64.6	47.6		53.5	69.4	
Level of Service	E	D		C	C		E	D		D	E	
Approach Delay (s)		41.2			29.3			51.9			66.9	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM Average Control Delay	40.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Appendix C

Construction Cost Estimates

COST ESTIMATE FOR COOK ROAD

ITEM	CODE	ITEM DESCRIPTION		TOTAL	UNIT PRICE	ESTIMATE
100	2002	PREPARING ROW	STA	3	$5,000.00	$15,000.00
104	2001	REMOVING CONC (PAV)	SY	250	$4.41	$1,102.50
110	2001	EXCAVATION (ROADWAY)	CY	0	$5.59	$0.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1	$5,983.51	$5,983.51
104		REMOVING CONC (CURB)	LF	350	$5.00	$1,750.00
529	2007	CONC CURB (DOWEL)	LF	0	$8.03	$0.00
666	2036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	0	$0.59	$0.00
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	0	$87.10	$0.00
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	0	$111.32	$0.00
666	2123	REFL PAV MRK TY I (Y) 8" (SLD) (100MIL)	LF	260	$0.67	$174.20
666	2191	PAVEMENT SEALER 8"	LF	0	$0.08	$0.00
666	2219	PAVEMENT SEALER (ARROW)	EA	0	$27.06	$0.00
666	2220	PAVEMENT SEALER (WORD)	EA	0	$27.95	$0.00
672	2012	REFL PAV MRKR TY I-C	EA	28	$3.06	$85.68
678	2003	PAV SURF PREP FOR MRK (8")	LF	260	$0.07	$18.20
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	0	$11.03	$0.00
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	0	$10.98	$0.00
3061	2004	FAST TRK CONC (CONT REINF HY STL) (13")	SY	250	$68.92	$17,230.00
					SUBTOTAL	**$41,344.09**
					CONTINGENCY	**$8,268.82**
					TOTAL	**$49,612.91**

COST ESTIMATE FOR LEFT TURN LANE WEST OF SOUTH KIRKWOOD ROAD

ITEM	CODE	ITEM DESCRIPTION		TOTAL	UNIT PRICE	ESTIMATE
100	2002	PREPARING ROW	STA	3	$5,000.00	$15,000.00
104	2001	REMOVING CONC (PAV)	SY	0	$4.41	$0.00
110	2001	EXCAVATION (ROADWAY)	CY	0	$5.59	$0.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1	$5,983.51	$5,983.51
104		REMOVING CONC (CURB)	LF	300	$5.00	$1,500.00
529	2007	CONC CURB (DOWEL)	LF	300	$8.03	$2,409.00
5316	2022	FIRE HYDRANT	EA	1	$2,500.00	$2,500.00
5316	2023	REMOVE AND SALVAGE FIRE HYDRANT	EA	1	$300.00	$300.00
666	2036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	250	$0.59	$147.50
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	1	$87.10	$87.10
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	1	$111.32	$111.32
666	2191	PAVEMENT SEALER 8"	LF	300	$0.08	$24.00
666	2219	PAVEMENT SEALER (ARROW)	EA	1	$27.06	$27.06
666	2220	PAVEMENT SEALER (WORD)	EA	1	$27.95	$27.95
672	2012	REFL PAV MRKR TY I-C	EA	26	$3.06	$79.56
678	2003	PAV SURF PREP FOR MRK (8")	LF	250	$0.07	$17.50
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	1	$11.03	$11.03
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	1	$10.98	$10.98
3061	2004	FAST TRK CONC (CONT REINF HY STL) (13")	SY	200	$68.92	$13,784.00
					SUBTOTAL	**$42,020.51**
					CONTINGENCY	**$8,404.10**
					TOTAL	**$50,424.61**

COST ESTIMATE FOR SB LEFT TURN LANE EXTENSION AT BOONE ROAD

ITEM	CODE	ITEM DESCRIPTION		TOTAL	UNIT PRICE	ESTIMATE
100	2002	PREPARING ROW	STA	3	$5,000.00	$15,000.00
104	2001	REMOVING CONC (PAV)	SY	20	$4.41	$88.20
104		REMOVING CONC (CURB)	LF	600	$5.00	$3,000.00
110	2001	EXCAVATION (ROADWAY)	CY	0	$5.59	$0.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1	$5,983.51	$5,983.51
529	2007	CONC CURB (DOWEL)	LF	600	$8.03	$4,818.00
666	2036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	175	$0.59	$103.25
666		REFL PAV MRK TY I (W) 8" (BRK) (100MIL)	LF	600	$0.59	$354.00
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	0	$87.10	$0.00
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	0	$111.32	$0.00
666	2123	REFL PAV MRK TY I (Y) 8" (SLD) (100MIL)	LF	300	$0.67	$201.00
666	2191	PAVEMENT SEALER 8"	LF	1075	$0.08	$86.00
666	2219	PAVEMENT SEALER (ARROW)	EA	0	$27.06	$0.00
666	2220	PAVEMENT SEALER (WORD)	EA	0	$27.95	$0.00
672	2012	REFL PAV MRKR TY I-C	EA	0	$3.06	$0.00
678	2003	PAV SURF PREP FOR MRK (8")	LF	1075	$0.07	$75.25
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	0	$11.03	$0.00
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	0	$10.98	$0.00
3061	2004	FAST TRK CONC (CONT REINF HY STL) (13")	SY	267	$68.92	$18,401.64
5316	2022	FIRE HYDRANT	EA	0	$2,500.00	$0.00
5316	2023	REMOVE AND SALVAGE FIRE HYDRANT	EA	0	$300.00	$0.00
					SUBTOTAL	**$48,110.85**
					CONTINGENCY	**$9,622.17**
					TOTAL	**$57,733.02**

COST ESTIMATE FOR WB LEFT TURN LANE AT BOONE ROAD

ITEM	CODE	ITEM DESCRIPTION		TOTAL	UNIT PRICE	ESTIMATE
100	2002	PREPARING ROW	STA	5	$5,000.00	$25,000.00
104	2001	REMOVING CONC (PAV)	SY	100	$4.41	$441.00
110	2001	EXCAVATION (ROADWAY)	CY	0	$5.59	$0.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1	$5,983.51	$5,983.51
104		REMOVING CONC (CURB)	LF	450	$5.00	$2,250.00
529	2007	CONC CURB (DOWEL)	LF	300	$8.03	$2,409.00
610	2042	INS RD IL AM (TY SA) 50T - 8 (.4 KW) S	EA	2	$3,313.10	$6,626.20
5316	2022	FIRE HYDRANT	EA	0	$2,500.00	$0.00
5316	2023	REMOVE AND SALVAGE FIRE HYDRANT	EA	0	$300.00	$0.00
624	2004	GROUND BOX TY 2 (243636) W / APRON	EA	1	$1,431.44	$1,431.44
666	2036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	200	$0.59	$118.00
666	2048	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	LF	40	$3.66	$146.40
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	1	$87.10	$87.10
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	1	$111.32	$111.32
666	2123	REFL PAV MRK TY I (Y) 8" (SLD) (100MIL)	LF	110	$0.67	$73.70
666	2191	PAVEMENT SEALER 8"	LF	310	$0.08	$24.80
666	2219	PAVEMENT SEALER (ARROW)	EA	1	$27.06	$27.06
666	2220	PAVEMENT SEALER (WORD)	EA	1	$27.95	$27.95
672	2012	REFL PAV MRKR TY I-C	EA	0	$3.06	$0.00
678	2003	PAV SURF PREP FOR MRK (8")	LF	410	$0.07	$28.70
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	1	$11.03	$11.03
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	1	$10.98	$10.98
3061	2004	FAST TRK CONC (CONT REINF HY STL) (13")	SY	350	$68.92	$24,122.00
		SINGLE INTERSECTION MAST ARMS	PER INT	1.5	$175,000.00	$262,500.00
					SUBTOTAL	**$331,430.19**
					CONTINGENCY	**$66,286.04**
					TOTAL	**$397,716.23**

COST ESTIMATE FOR LEFT TURN LANE WEST OF BOONE ROAD

ITEM	CODE	ITEM DESCRIPTION		TOTAL	UNIT PRICE	ESTIMATE
100	2002	PREPARING ROW	STA	2	$5,000.00	$10,000.00
104	2001	REMOVING CONC (PAV)	SY	0	$4.41	$0.00
110	2001	EXCAVATION (ROADWAY)	CY	0	$5.59	$0.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1	$5,983.51	$5,983.51
104		REMOVING CONC (CURB)	LF	200	$5.00	$1,000.00
529	2007	CONC CURB (DOWEL)	LF	200	$8.03	$1,606.00
5316	2022	FIRE HYDRANT	EA	0	$2,500.00	$0.00
5316	2023	REMOVE AND SALVAGE FIRE HYDRANT	EA	0	$300.00	$0.00
666	2036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	75	$0.59	$44.25
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	0	$87.10	$0.00
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	0	$111.32	$0.00
666	2123	REFL PAV MRK TY I (Y) 8" (SLD) (100MIL)	LF	0	$0.67	$0.00
666	2191	PAVEMENT SEALER 8"	LF	75	$0.08	$6.00
666	2219	PAVEMENT SEALER (ARROW)	EA	0	$27.06	$0.00
666	2220	PAVEMENT SEALER (WORD)	EA	0	$27.95	$0.00
672	2012	REFL PAV MRKR TY I-C	EA	0	$3.06	$0.00
678	2003	PAV SURF PREP FOR MRK (8")	LF	75	$0.07	$5.25
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	0	$11.03	$0.00
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	0	$10.98	$0.00
3061	2004	FAST TRK CONC (CONT REINF HY STL) (13")	SY	225	$68.92	$15,507.00
					SUBTOTAL	**$34,152.01**
					CONTINGENCY	**$6,830.40**
					TOTAL	**$40,982.41**

COST ESTIMATE FOR SB LEFT TURN LANE EXTENSION AT WILCREST DRIVE

ITEM	CODE	ITEM DESCRIPTION		TOTAL	UNIT PRICE	ESTIMATE
100	2002	PREPARING ROW	STA	2	$5,000.00	$10,000.00
104	2001	REMOVING CONC (PAV)	SY	0	$4.41	$0.00
110	2001	EXCAVATION (ROADWAY)	CY	0	$5.59	$0.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1	$5,983.51	$5,983.51
104		REMOVING CONC (CURB)	LF	170	$5.00	$850.00
529	2007	CONC CURB (DOWEL)	LF	170	$8.03	$1,365.10
610	2042	INS RD IL AM (TY SA) 50T - 8 (.4 KW) S	EA	0	$3,313.10	$0.00
5316	2022	FIRE HYDRANT	EA	0	$2,500.00	$0.00
5316	2023	REMOVE AND SALVAGE FIRE HYDRANT	EA	0	$300.00	$0.00
666	2036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	170	$0.59	$100.30
666	2048	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	LF	0	$3.66	$0.00
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	0	$87.10	$0.00
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	0	$111.32	$0.00
666	2123	REFL PAV MRK TY I (Y) 8" (SLD) (100MIL)	LF	0	$0.67	$0.00
666	2191	PAVEMENT SEALER 8"	LF	170	$0.08	$13.60
666	2219	PAVEMENT SEALER (ARROW)	EA	0	$27.06	$0.00
666	2220	PAVEMENT SEALER (WORD)	EA	0	$27.95	$0.00
672	2012	REFL PAV MRKR TY I-C	EA	0	$3.06	$0.00
678	2003	PAV SURF PREP FOR MRK (8")	LF	170	$0.07	$11.90
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	0	$11.03	$0.00
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	0	$10.98	$0.00
3061	2004	FAST TRK CONC (CONT REINF HY STL) (13")	SY	185	$68.92	$12,750.20
		SINGLE INTERSECTION MAST ARMS	PER INT	0	$175,000.00	$0.00
					SUBTOTAL	**$31,074.61**
					CONTINGENCY	**$6,214.92**
					TOTAL	**$37,289.53**

COST ESTIMATE FOR LEFT TURN LANE AT WILCREST DRIVE (WB)

ITEM	CODE	ITEM DESCRIPTION		TOTAL	UNIT PRICE	ESTIMATE
100	2002	PREPARING ROW	STA	4	$5,000.00	$20,000.00
104	2001	REMOVING CONC (PAV)	SY	0	$4.41	$0.00
110	2001	EXCAVATION (ROADWAY)	CY	0	$5.59	$0.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1	$5,983.51	$5,983.51
104		REMOVING CONC (CURB)	LF	280	$5.00	$1,400.00
529	2007	CONC CURB (DOWEL)	LF	430	$8.03	$3,452.90
610	2042	INS RD IL AM (TY SA) 50T - 8 (.4 KW) S	EA	0	$3,313.10	$0.00
5316	2022	FIRE HYDRANT	EA	0	$2,500.00	$0.00
5316	2023	REMOVE AND SALVAGE FIRE HYDRANT	EA	0	$300.00	$0.00
628	2006	ELC SRV TY A 120/240 060 (SS) SS 9E) GC (U	EA	0	$4,935.00	$0.00
682	2014	PED SIG SEC (12 IN) LED (2 INDICATIONS)	EA	0	$395.62	$0.00
666	2036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	150	$0.59	$88.50
666	2048	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	LF	0	$3.66	$0.00
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	1	$87.10	$87.10
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	1	$111.32	$111.32
666	2123	REFL PAV MRK TY I (Y) 8" (SLD) (100MIL)	LF	0	$0.67	$0.00
666	2191	PAVEMENT SEALER 8"	LF	150	$0.08	$12.00
666	2219	PAVEMENT SEALER (ARROW)	EA	1	$27.06	$27.06
666	2220	PAVEMENT SEALER (WORD)	EA	1	$27.95	$27.95
672	2012	REFL PAV MRKR TY I-C	EA	0	$3.06	$0.00
678	2003	PAV SURF PREP FOR MRK (8")	LF	150	$0.07	$10.50
678	2006	PAV SURF PREP FOR MRK (24")	LF	0	$0.14	$0.00
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	1	$11.03	$11.03
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	1	$10.98	$10.98
3061	2004	FAST TRK CONC (CONT REINF HY STL) (13")	SY	205	$68.92	$14,128.60
6266	2003	VIVDS SET - UP SYSTEM	EA	0	$475.66	$0.00
6964	2001	CTMS RELOCATION (CCTV)	EA	0	$17,710.00	$0.00
		SINGLE INTERSECTION MAST ARMS	PER INT	0	$175,000.00	$0.00
					SUBTOTAL	**$45,351.45**
					CONTINGENCY	**$9,070.29**
					TOTAL	**$54,421.74**

COST ESTIMATE FOR RIGHT TURN LANE AT WILCREST DRIVE (WB)

ITEM	CODE	ITEM DESCRIPTION		TOTAL	UNIT PRICE	ESTIMATE
100	2002	PREPARING ROW	STA	5	$5,000.00	$25,000.00
104	2001	REMOVING CONC (PAV)	SY	140	$4.41	$617.40
110	2001	EXCAVATION (ROADWAY)	CY	0	$5.59	$0.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1	$5,983.51	$5,983.51
104		REMOVING CONC (CURB)	LF	500	$5.00	$2,500.00
529	2007	CONC CURB (DOWEL)	LF	500	$8.03	$4,015.00
610	2042	INS RD IL AM (TY SA) 50T - 8 (.4 KW) S	EA	2	$3,313.10	$6,626.20
5316	2022	FIRE HYDRANT	EA	0	$2,500.00	$0.00
5316	2023	REMOVE AND SALVAGE FIRE HYDRANT	EA	0	$300.00	$0.00
628	2006	ELC SRV TY A 120/240 060 (SS) SS 9E) GC (U	EA	1	$4,935.00	$4,935.00
682	2014	PED SIG SEC (12 IN) LED (2 INDICATIONS)	EA	1	$395.62	$395.62
666	2036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	300	$0.59	$177.00
666	2048	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	LF	10	$3.66	$36.60
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	0	$87.10	$0.00
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	0	$111.32	$0.00
666	2123	REFL PAV MRK TY I (Y) 8" (SLD) (100MIL)	LF	0	$0.67	$0.00
666	2191	PAVEMENT SEALER 8"	LF	310	$0.08	$24.80
666	2219	PAVEMENT SEALER (ARROW)	EA	0	$27.06	$0.00
666	2220	PAVEMENT SEALER (WORD)	EA	0	$27.95	$0.00
672	2012	REFL PAV MRKR TY I-C	EA	0	$3.06	$0.00
678	2003	PAV SURF PREP FOR MRK (8")	LF	300	$0.07	$21.00
678	2006	PAV SURF PREP FOR MRK (24")	LF	10	$0.14	$1.40
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	0	$11.03	$0.00
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	0	$10.98	$0.00
3061	2004	FAST TRK CONC (CONT REINF HY STL) (13")	SY	480	$68.92	$33,081.60
6266	2003	VIVDS SET - UP SYSTEM	EA	1	$475.66	$475.66
6964	2001	CTMS RELOCATION (CCTV)	EA	1	$17,710.00	$17,710.00
		SINGLE INTERSECTION MAST ARMS	PER INT	0	$175,000.00	$0.00
					SUBTOTAL	**$101,600.79**
					CONTINGENCY	**$20,320.16**
					TOTAL	**$121,920.95**

COST ESTIMATE FOR NB LEFT TURN LANE EXTENSION AT WILCREST DRIVE

ITEM	CODE	ITEM DESCRIPTION		TOTAL	UNIT PRICE	ESTIMATE
100	2002	PREPARING ROW	STA	2	$5,000.00	$10,000.00
104	2001	REMOVING CONC (PAV)	SY	0	$4.41	$0.00
110	2001	EXCAVATION (ROADWAY)	CY	0	$5.59	$0.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1	$5,983.51	$5,983.51
104		REMOVING CONC (CURB)	LF	250	$5.00	$1,250.00
529	2007	CONC CURB (DOWEL)	LF	250	$8.03	$2,007.50
610	2042	INS RD IL AM (TY SA) 50T - 8 (.4 KW) S	EA	0	$3,313.10	$0.00
5316	2022	FIRE HYDRANT	EA	0	$2,500.00	$0.00
5316	2023	REMOVE AND SALVAGE FIRE HYDRANT	EA	0	$300.00	$0.00
628	2006	ELC SRV TY A 120/240 060 (SS) SS 9E) GC (U	EA	0	$4,935.00	$0.00
682	2014	PED SIG SEC (12 IN) LED (2 INDICATIONS)	EA	0	$395.62	$0.00
666	2036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	200	$0.59	$118.00
666	2048	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	LF	0	$3.66	$0.00
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	0	$87.10	$0.00
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	0	$111.32	$0.00
666	2123	REFL PAV MRK TY I (Y) 8" (SLD) (100MIL)	LF	0	$0.67	$0.00
666	2191	PAVEMENT SEALER 8"	LF	200	$0.08	$16.00
666	2219	PAVEMENT SEALER (ARROW)	EA	0	$27.06	$0.00
666	2220	PAVEMENT SEALER (WORD)	EA	0	$27.95	$0.00
672	2012	REFL PAV MRKR TY I-C	EA	0	$3.06	$0.00
678	2003	PAV SURF PREP FOR MRK (8")	LF	200	$0.07	$14.00
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	0	$11.03	$0.00
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	0	$10.98	$0.00
3061	2004	FAST TRK CONC (CONT REINF HY STL) (13")	SY	220	$68.92	$15,162.40
		SINGLE INTERSECTION MAST ARMS	PER INT	0	$175,000.00	$0.00
					SUBTOTAL	**$34,551.41**
					CONTINGENCY	**$6,910.28**
					TOTAL	**$41,461.69**

COST ESTIMATE FOR ADDITIONAL WESTBOUND LANE

ITEM	CODE	ITEM DESCRIPTION		TOTAL	UNIT PRICE	ESTIMATE
100	2002	PREPARING ROW	STA	54	$5,000.00	$270,000.00
104	2001	REMOVING CONC (PAV)	SY	800	$4.41	$3,528.00
110	2001	EXCAVATION (ROADWAY)	CY	0	$5.59	$0.00
502	2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	3	$5,983.51	$17,950.53
104		REMOVING CONC (CURB)	LF	4675	$5.00	$23,375.00
529	2007	CONC CURB (DOWEL)	LF	4675	$8.03	$37,540.25
610	2042	INS RD IL AM (TY SA) 50T - 8 (.4 KW) S	EA	4	$3,313.10	$13,252.40
624	2004	GROUND BOX TY 2 (243636) W / APRON	EA	4	$1,431.44	$5,725.76
666	2036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	935	$0.59	$551.65
666	2042	REFL PAV MRK TY I (W) 12" (SLD) (100MIL)	LF	160	$1.87	$299.20
666	2054	REFL PAV MRK TY I (W) (ARROW) (100MIL)	EA	11	$87.10	$958.10
666	2096	REFL PAV MRK TY I (W) (WORD) (100MIL)	EA	11	$111.32	$1,224.52
666	2123	REFL PAV MRK TY I (Y) 8" (SLD) (100MIL)	LF	0	$0.67	$0.00
666	2191	PAVEMENT SEALER 8"	LF	935	$0.08	$74.80
666	2195	PAVEMENT SEALER 24"	LF	160	$1.33	$212.80
666	2219	PAVEMENT SEALER (ARROW)	EA	11	$27.06	$297.66
666	2220	PAVEMENT SEALER (WORD)	EA	11	$27.95	$307.45
672	2012	REFL PAV MRKR TY I-C	EA	0	$3.06	$0.00
678	2003	PAV SURF PREP FOR MRK (8")	LF	935	$0.07	$65.45
678	2006	PAV SURF PREP FOR MRK (24")	LF	160	$0.14	$22.40
678	2007	PAV SURF PREP FOR MRK (ARROW)	EA	11	$11.03	$121.33
678	2018	PAV SURF PREP FOR MRK (WORD)	EA	11	$10.98	$120.78
3061	2004	FAST TRK CONC (CONT REINF HY STL) (13")	SY	350	$68.92	$24,122.00
5316	2022	FIRE HYDRANT	EA	3	$2,500.00	$7,500.00
5316	2023	REMOVE AND SALVAGE FIRE HYDRANT	EA	3	$300.00	$900.00
6007	2001	REMOVING TRAFFIC SIGNALS	EA	8	$1,183.28	$9,466.24
		SINGLE INTERSECTION MAST ARMS	PER INT	4	$175,000.00	$700,000.00
					SUBTOTAL	**$1,117,616.32**
					CONTINGENCY	**$223,523.26**
					TOTAL	**$1,341,139.58**