Traffic and Parking Study

Three Hubbard Road

Wilton, Connecticut

Prepared for:

Three Hubbard Rd LLC

Prepared by:

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Traffic and Parking Study
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Wilton, Connecticut

This study examines the traffic and parking impact for the addition of 17 apartments at Three Hubbard Road in Wilton, Connecticut. Levels of Service (LOS) for traffic flows under 2020 existing and 2021 no-build and build traffic conditions were analyzed to identify any deficiencies in existing and future traffic operations at area intersections. For the purpose of this traffic study, 2021 was assumed to be the year during which construction is completed and the apartments are occupied.

I. Summary

- The new apartments are estimated to generate six vehicular trips during the weekday morning peak hour, seven trips during the weekday afternoon peak hour, and seven trips during the Saturday midday peak hour.

- The new apartments will produce negligible traffic impact on area intersections. After the new apartments are built, traffic will continue to operate at acceptable LOS at area intersections during peak hours.

- Three Hubbard Road shares parking with the Bankwell site to the north. Parking analysis based on field parking counts and ITE data concluded that there will be adequate parking for the proposed new apartments.

II. Project Description

Three Hubbard Road is the site for 24 existing apartments. 17 new apartments are proposed. The number of parking spaces will remain unchanged after the construction. The site has a shared parking arrangement with the Bankwell site to the north to take advantage of different peaks of parking needs for the two land uses.

III. Existing Traffic Conditions

To evaluate the quality of traffic operation in the vicinity of the redevelopment, the following intersections were analyzed for the study:

- Route 33 (Ridgefield Road) and Old Ridgefield Road;
- Route 33 and Center Street; and
- Route 106 (Wolfpit Road), Range Road, and Horseshoe Road.

Traffic counts for the three intersections were collected during weekday morning, weekday afternoon, and Saturday midday peak hours in January 2020. The peak-hour volumes from the counts were seasonally adjusted to reflect traffic volumes for the busiest summer month of June.

Recent-year average daily traffic volumes compiled by ConnDOT (Tables 1 and 2) show relatively little traffic growth on Route 33 and Route 106 over the long term. For this study, a conservative one percent annual growth rate was assumed between 2020 and 2021.

Table 1 Average Daily Traffic (ADT) for Route 33

Year	1990	1992	1995	1996	1999	2002	2005	2008	2014
Route 33, east of Belden Hill Road	12,100	13,100	11,500	12,600	13,200	14,000	12,100	11,000	12,600

Source: ConnDOT

Table 2 Average Daily Traffic (ADT) for Route 106

Year	2002	2005	2008	2014
Route 106, southwest of Range Road	5,900	6,600	6,300	5,700

Source: ConnDOT

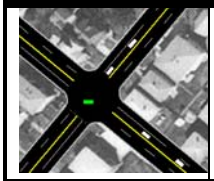
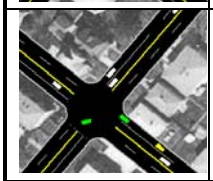
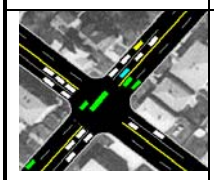
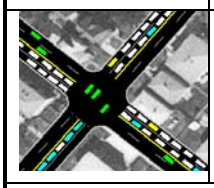
Capacity Analysis

To assess the quality of traffic flow, intersection capacity analysis was conducted for the existing, future no-build and future build traffic conditions. Capacity analysis provides an indication of how well roadway facilities serve the traffic demands placed upon them. *Synchro 10*, a software package that includes the evaluation criteria of the *2000 Highway Capacity Manual (HCM 2000)*, was used to analyze the intersections.

Level of service (LOS) is the term used to describe the different operating conditions that occur on a given roadway segment or intersection under various traffic conditions. It is a qualitative measure of the effects of a number of factors including roadway geometry, speed, travel delay, freedom to maneuver, and safety. Six levels of service can be defined for each type of facility. Each level of service (LOS) is given a letter designation from A to F, with LOS A representing the best operating conditions and LOS F representing the worst.

LOS at intersection is measured in terms of average control delay. For signalized intersections and all-way stop-controlled intersections, the analysis considers the operation of all traffic entering the intersection, and an overall condition is reported in addition to individual movements. For two-way stop-controlled (TWSC) intersections where side street traffic has to stop for main street traffic, the analysis assumes that through traffic on the main street is not affected by traffic on side streets. Thus, LOS is calculated for the main street left-turn and side street approaches, and no overall intersection LOS is defined for TWSC intersections. Table 3 presents the LOS criteria for signalized and unsignalized intersections as defined in the HCM 2000.

Table 3 LOS Criteria for Signalized and Unsignalized Intersections

	Level-of-Service (LOS)	Signalized Delay Range (Average Control Delay, in sec/veh)	Unsignalized Delay Range (Average Control Delay in sec/veh)
	**A**	≤ 10	≤ 10
	**B**	> 10 and ≤ 20	> 10 and ≤ 15
	**C**	> 20 and ≤ 35	> 15 and ≤ 25
	**D**	> 35 and ≤ 55	> 25 and ≤ 35
	**E**	> 55 and ≤ 80	> 35 and ≤ 50
	**F**	> 80	> 50

Source: 2000 Highway Capacity Manual (Exhibits 16-2 and 17-2)

Table 4 that follows shows the capacity analysis results for the analyzed intersections under the 2020 existing traffic conditions. All traffic approaches are operating at acceptable LOS D or better during the three peak hours.

Table 4 Capacity Analyses for Existing Conditions

Intersection	2020 Existing Conditions					
	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday Midday Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Rt. 33 and Old Ridgefield Rd. (Signalized)						
EB Rt. 33	4.2	A	13.3	B	9.4	A
WB Rt. 33	3.5	A	10.8	B	8.0	A
NB Old Ridgefield Rd.	41.1	D	35.1	D	28.0	C
Intersection	5.6	A	18.3	B	12.4	B
Rt. 33 and Center St. (Unsignalized)						
WB Rt. 33 Left Turn	13.2	B	9.1	A	13.8	B
NB Center St.	12.2	B	25.4	D	13.0	B
Rt. 106, Horseshoe Rd., and Range Rd. (Signalized)						
EB Rt. 106 Left Turn	43.1	D	17.1	B	13.1	B
EB Rt. 106 Through and Right Turn	15.1	B	15.4	B	13.1	B
WB Rt. 106	9.8	A	11.9	B	8.8	A
SB Horseshoe Rd. Left Turn	27.9	C	32.8	C	21.8	C
SB Horseshoe Rd. Through and Right Turn	20.6	C	18.2	B	17.1	B
NB Range Rd.	20.8	C	22.4	C	17.7	B
Intersection	20.9	C	17.7	B	13.9	B

EB Eastbound
WB Westbound
NB Northbound
SB Southbound
LOS Level of Service

IV. Future Traffic Conditions

For the purpose of this study, it was assumed that the 17 new apartments will be constructed and occupied in 2021. As a comparison for demonstrating the traffic impact of the project, a 2021 no-build scenario is included in the study. The 2021 no-build traffic volumes used for traffic analysis were generated using an annual background traffic growth rate of one percent between 2020 and 2021, independent of the development.

Table 5 details the capacity analysis results for the 2021 no-build traffic conditions. Under the no-build conditions, all traffic approaches will continue to operate at acceptable LOS D or better during the three peak hours.

Table 5 Capacity Analyses for No-Build Conditions

Intersection	2021 No-Build Conditions					
	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday Midday Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Rt. 33 and Old Ridgefield Rd. (Signalized)						
EB Rt. 33	4.3	A	13.5	B	9.6	A
WB Rt. 33	3.5	A	11.0	B	8.1	A
NB Old Ridgefield Rd.	41.2	D	35.0	C	27.9	C
Intersection	5.7	A	18.4	B	12.5	B
Rt. 33 and Center St. (Unsignalized)						
WB Rt. 33 Left Turn	13.4	B	9.1	A	14.0	B
NB Center St.	12.3	B	26.2	D	13.1	B
Rt. 106, Horseshoe Rd., and Range Rd. (Signalized)						
EB Rt. 106 Left Turn	44.0	D	17.3	B	13.3	B
EB Rt. 106 Through and Right Turn	15.1	B	15.5	B	13.3	B
WB Rt. 106	9.9	A	12.1	B	9.0	A
SB Horseshoe Rd. Left Turn	29.1	C	34.7	C	21.7	C
SB Horseshoe Rd. Through and Right Turn	20.9	C	18.2	B	17.0	B
NB Range Rd.	21.1	C	22.5	C	17.7	B
Intersection	21.3	C	18.0	B	14.0	B

EB Eastbound
WB Westbound
NB Northbound
SB Southbound
LOS Level of Service

Trip Generation

Land Use (LU) 221, Multifamily Housing (Mid-Rise), from *Trip Generation, 10th Edition* published by the Institute of Transportation Engineers (ITE) was used to estimate the number of trips generated by the new apartments.

The 17 new apartments will generate approximately six trips during the weekday morning peak hour, seven trips during the weekday afternoon peak hour, and seven trips during the Saturday midday peak hour.

Table 6 Trip Generation (vph)

LU 221, Multifamily Housing (Mid-Rise) (17 New Units)			
	Entry	Exit	Entry & Exit
Weekday AM Peak Hour of Adjacent Street	2	4	6
Weekday PM Peak Hour of Adjacent Street	4	3	7
Saturday Midday Peak Hour	3	4	7

vph Vehicles per hour

Table 7 depicts the distribution of the site-generated trips along area routes. The distribution takes into account the relative traffic volumes of area roadways and the development patterns in this part of Wilton.

Table 7 Trip Distribution

Route	Entry and Exit
North: Route 7 via Center Street	30%
North and West: Route 33 via Old Ridgefield Road	10%
South: Route 7 via Center Street	50%
West: Route 106 via Horseshoe Road	10%
Total	100%

Traffic volumes for the analysis of the 2021 build conditions are combinations of the no-build volumes and the site-generated trips distributed to area roadways using the information above.

Capacity Analysis

Table 8 shows the capacity analysis results for the 2021 build traffic conditions. All traffic approaches and intersections will operate at acceptable LOS D or better. Compared with the no-build conditions, there will be only limited changes in average delays at the three intersections. The traffic approach with the largest increase in average delay will be the northbound Center Street approach at Route 33 during the afternoon peak hour. The peak-hour average delay for the approach will only increase 0.3 second, from 26.2 seconds under the no-build condition to 26.5 seconds under the build condition.

It is therefore concluded that the traffic impact of the 17 new apartments on area roadways will be negligible.

Table 8 Capacity Analyses for Build Conditions

Intersection	2021 Build Conditions					
	Weekday AM Peak Hour		Weekday PM Peak Hour		Saturday Midday Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Rt. 33 and Old Ridgefield Rd. (Signalized)						
EB Rt. 33	4.3	A	13.5	B	9.6	A
WB Rt. 33	3.5	A	11.0	B	8.2	A
NB Old Ridgefield Rd.	41.1	D	35.0	C	27.9	C
Intersection	5.7	A	18.4	B	12.6	B
Rt. 33 and Center St. (Unsignalized)						
WB Rt. 33 Left Turn	13.5	B	9.1	A	14.1	B
NB Center St.	12.3	B	26.5	D	13.1	B
Rt. 106, Horseshoe Rd., and Range Rd. (Signalized)						
EB Rt. 106 Left Turn	44.0	D	17.3	B	13.3	B
EB Rt. 106 Through and Right Turn	15.1	B	15.5	B	13.3	B
WB Rt. 106	9.9	A	12.1	B	9.0	A
SB Horseshoe Rd. Left Turn	29.1	C	34.7	C	21.7	C
SB Horseshoe Rd. Through and Right Turn	20.9	C	18.2	B	17.0	B
NB Range Rd.	21.1	C	22.5	C	17.7	B
Intersection	21.3	C	18.0	B	14.0	B

EB Eastbound
WB Westbound
NB Northbound
SB Southbound
LOS Level of Service

V. Parking Analysis

After the 17 apartments are constructed, the number of parking spaces on the site and an existing shared parking arrangement with the adjacent Bankwell site will remain unchanged. The Three Hubbard Road site currently provides 53 parking spaces. The Bankwell site provides 16 spaces, including a space that straddles the property line separating the two sites.

Numbers of parked vehicles on the two sites were recorded at 9:15 AM on Friday, January 10, 2020; at 4:35 PM on Monday, January 6, 2020; at 11:15 PM on Wednesday, January 8, 2020; and at 1:20 PM on Saturday, January 11, 2020. Because observed Saturday parking demand is much lower than those for weekdays (15 parked vehicles at 1:20 PM on a Saturday), the following discussions will focus on parking on weekdays.

Between 7:00 PM and 8:00 AM on weekdays when the bank was closed, all parked vehicles on the two sites were for the existing apartments; the hourly parking demand during these hours for the 24 existing apartments were calculated using the 11:15 PM

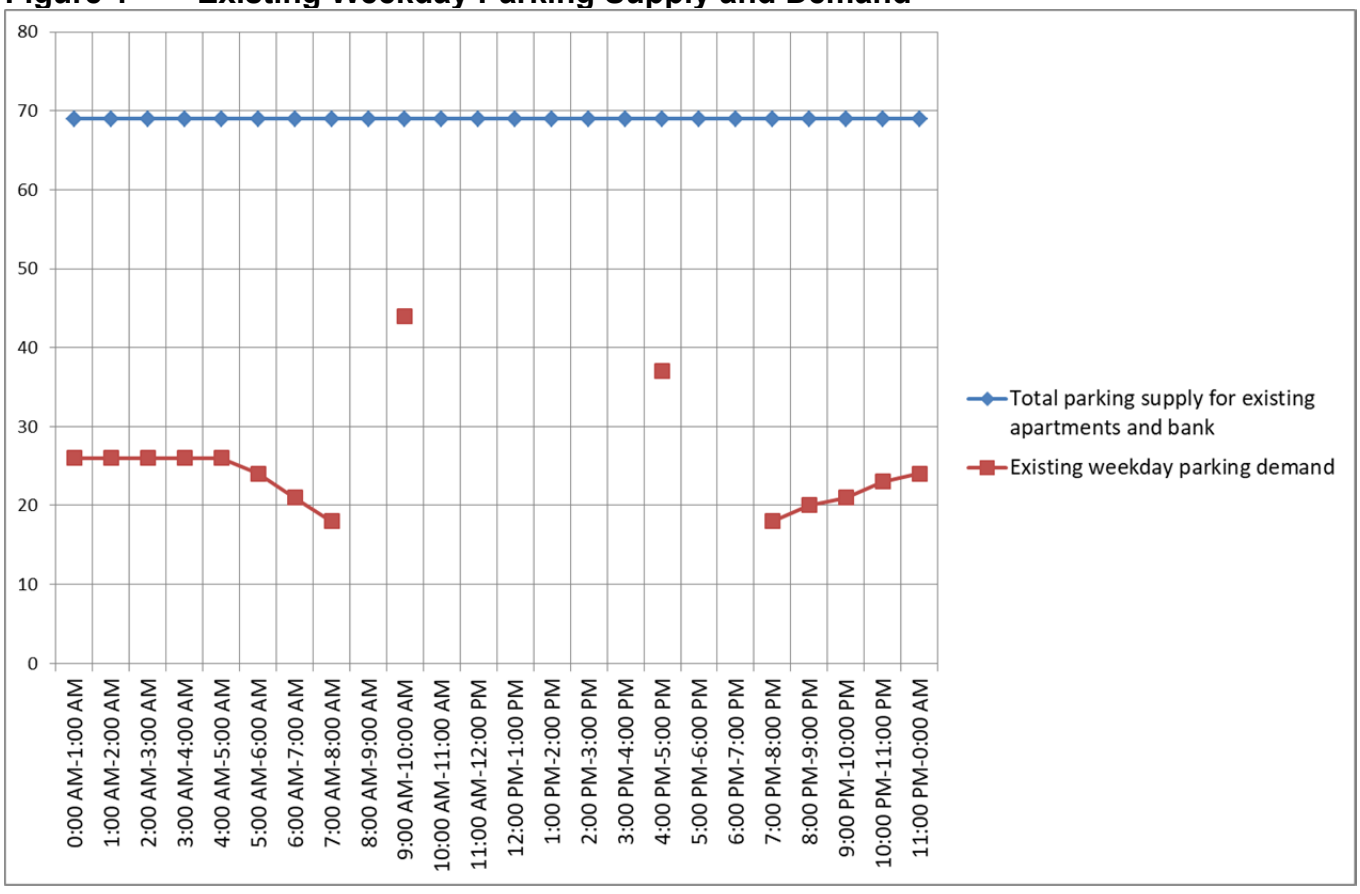
parking count and data from a "Percent of Peak Parking Demand" table from 5th Edition of ITE *Parking Generation Manual* (see Appendices).

The existing parking supply and demand for the two sites are illustrated in Table 9 and Figure 1. The highest parking demand of 44 vehicles occurred between 9:00 AM and 10:00 AM; there were 25 unused spaces during that hour.

Table 9 Existing Weekday Parking Supply and Demand

	0:00 AM-1:00 AM	1:00 AM-2:00 AM	2:00 AM-3:00 AM	3:00 AM-4:00 AM	4:00 AM-5:00 AM	5:00 AM-6:00 AM	6:00 AM-7:00 AM	7:00 AM-8:00 AM	8:00 AM-9:00 AM	9:00 AM-10:00 AM	10:00 AM-11:00 AM	11:00 AM-12:00 PM	12:00 PM-1:00 PM	1:00 PM-2:00 PM	2:00 PM-3:00 PM	3:00 PM-4:00 PM	4:00 PM-5:00 PM	5:00 PM-6:00 PM	6:00 PM-7:00 PM	7:00 PM-8:00 PM	8:00 PM-9:00 PM	9:00 PM-10:00 PM	10:00 PM-11:00 PM	11:00 PM-0:00 AM
Total parking supply for existing apartments and bank	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Existing weekday parking demand	26	26	26	26	26	24	21	18		44							37			18	20	21	23	24

Figure 1 Existing Weekday Parking Supply and Demand



According to the ITE table in the Appendices, the 11:00 PM-12:00 PM parking count of 24 vehicles for the 24 existing apartments represents 93% of peak parking demand. The per-unit peak parking demand for the 24 existing apartments was calculated as follows:

(24/24)/93% = 1.075 spaces per unit.

Based on the per-unit peak parking demand, the 17 new apartments will generate the following peak parking demand:

1.075*17 = 18.3, or 19 spaces

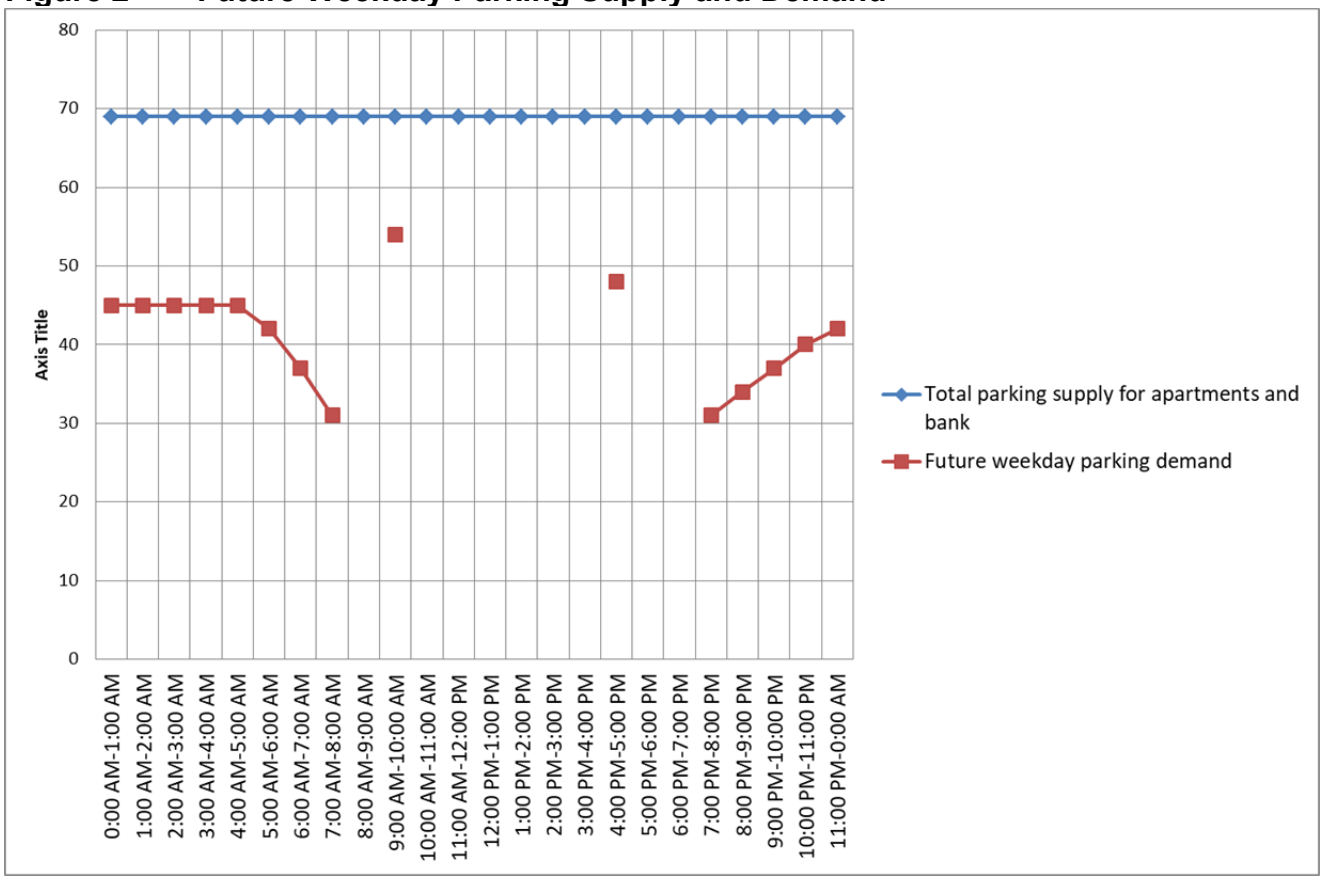
This new peak parking demand of 19 spaces was converted to hourly demand using the ITE table, and the resulting hourly parking demand for the 17 new apartments was added to the existing hourly demand for which data is available. The results are shown in Table 10 and Figure 2. The hour with the most parking demand of 54 vehicles will be between 9:00 AM and 10:00 AM; even during this busiest hour, there will be 15 unused spaces on the two sites.

There will be adequate parking for the proposed 17 new apartments.

Table 10 Future Weekday Parking Supply and Demand

	0:00 AM-1:00 AM	1:00 AM-2:00 AM	2:00 AM-3:00 AM	3:00 AM-4:00 AM	4:00 AM-5:00 AM	5:00 AM-6:00 AM	6:00 AM-7:00 AM	7:00 AM-8:00 AM	8:00 AM-9:00 AM	9:00 AM-10:00 AM	10:00 AM-11:00 AM	11:00 AM-12:00 PM	12:00 PM-1:00 PM	1:00 PM-2:00 PM	2:00 PM-3:00 PM	3:00 PM-4:00 PM	4:00 PM-5:00 PM	5:00 PM-6:00 PM	6:00 PM-7:00 PM	7:00 PM-8:00 PM	8:00 PM-9:00 PM	9:00 PM-10:00 PM	10:00 PM-11:00 PM	11:00 PM-0:00 AM
Total parking supply for apartments and bank	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Future weekday parking demand	45	45	45	45	45	42	37	31		54							48			31	34	37	40	42

Figure 2 Future Weekday Parking Supply and Demand



VI. Conclusions

Area traffic operation was analyzed for 17 new apartments at Three Hubbard Road under 2020 existing and 2021 no-build and build traffic conditions. After the construction, acceptable LOS D or better will be maintained at area intersections. The development is expected to produce negligible traffic impact on area roadways. Adequate parking will be provided for the new apartments.

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Technical Appendices

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CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY & PLANNING - SYSTEMS MODELING & FORECASTING
TRAFFIC DATA COLLECTION & VERIFICATION SECTION

FACTORS FOR EXPANDING 24-HOUR COUNTS TO
ANNUAL AVERAGE DAILY TRAFFIC VOLUMES
(BASED ON 2009 & 2010 CONTINUOUS COUNT STATION DATA

**GROUP - 1 * * INTERSTATE * *
STATION(S): 7, 24, 26, 30, 32, 45, 49, 54, 55**

	AVG. WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.06	0.98	1.17	1.48
FEBRUARY	1.06	0.97	1.12	1.34
MARCH	1.01	0.90	1.09	1.24
APRIL	0.96	0.87	1.03	1.13
MAY	0.94	0.85	1.01	1.11
JUNE	0.93	0.85	1.00	1.08
JULY	0.93	0.85	0.97	1.06
AUGUST	0.92	0.85	0.97	1.06
SEPTEMBER	0.96	0.86	1.02	1.13
OCTOBER	0.98	0.86	1.03	1.10
NOVEMBER	0.99	0.91	1.06	1.19
DECEMBER	1.00	0.94	1.17	1.42

**GROUP - 2 * * RURAL * *
STATION(S): 4, 10, 13, 16, 20, 50, 51**

	AVG. WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.08	1.01	1.16	1.61
FEBRUARY	1.08	1.00	1.12	1.41
MARCH	1.03	0.93	1.02	1.30
APRIL	0.97	0.90	1.00	1.23
MAY	0.94	0.84	0.93	1.12
JUNE	0.92	0.84	0.92	1.13
JULY	0.90	0.83	0.92	1.05
AUGUST	0.92	0.84	0.94	1.11
SEPTEMBER	0.95	0.88	0.96	1.15
OCTOBER	0.98	0.91	1.01	1.16
NOVEMBER	0.99	0.92	1.04	1.29
DECEMBER	1.00	0.92	1.08	1.47

GROUP - 3 * * INTERSTATE * * (AVERAGE OF 2006-2007 & 2007-2008)
STATION(S): 27 (I-84 FROM ROUTE 195 TO MASS. STATE LINE)

	AVG. WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.47	1.08	1.22	1.15
FEBRUARY	1.35	1.04	1.20	1.12
MARCH	1.32	0.97	1.08	1.03
APRIL	1.13	0.83	0.93	0.88
MAY	1.09	0.78	0.85	0.82
JUNE	1.03	0.76	0.85	0.81
JULY	0.97	0.77	0.75	0.76
AUGUST	1.10	0.82	0.87	0.85
SEPTEMBER	1.03	0.74	0.78	0.76
OCTOBER	1.14	0.76	0.86	0.81
NOVEMBER	1.18	0.85	0.97	0.91
DECEMBER	1.15	0.99	1.13	1.06

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CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY & PLANNING - SYSTEMS INFORMATION
TRAFFIC MONITORING & DATA ANALYSIS SECTION

FACTORS FOR EXPANDING 24-HOUR COUNTS TO
ANNUAL AVERAGE DAILY TRAFFIC VOLUMES
(BASED ON 2009 & 2010 CONTINUOUS COUNT STATION DATA

GROUP - 4 * * URBAN * *
STATION(S): 2, 11, 17, 19, 22, 23, 28, 47, 48, 52

	AVG. WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.01	0.94	1.18	1.60
FEBRUARY	1.01	0.94	1.15	1.45
MARCH	0.98	0.90	1.10	1.38
APRIL	0.94	0.88	1.08	1.33
MAY	0.90	0.83	1.02	1.24
JUNE	0.90	0.84	1.01	1.24
JULY	0.91	0.85	1.04	1.27
AUGUST	0.92	0.85	1.05	1.26
SEPTEMBER	0.92	0.86	1.03	1.27
OCTOBER	0.92	0.85	1.04	1.24
NOVEMBER	0.93	0.89	1.08	1.32
DECEMBER	0.96	0.90	1.11	1.48

GROUP - 5 * *NORTHWEST RECREATIONAL * *
STATION(S): 1, 18

	AVG. WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.59	1.15	1.13	1.22
FEBRUARY	1.53	1.16	1.08	1.02
MARCH	1.53	1.08	1.05	1.08
APRIL	1.29	0.98	0.85	0.91
MAY	1.19	0.79	0.83	0.76
JUNE	1.10	0.77	0.82	0.69
JULY	0.95	0.67	0.59	0.52
AUGUST	0.92	0.63	0.60	0.57
SEPTEMBER	1.17	0.81	0.73	0.68
OCTOBER	1.16	0.87	0.79	0.70
NOVEMBER	1.30	1.00	1.01	0.92
DECEMBER	1.49	1.12	1.27	1.38

GROUP - 6 * * SOUTHEAST RECREATIONAL * *
STATION(S): 5, 33, 44, 46

	AVG. WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.18	1.04	1.13	1.37
FEBRUARY	1.15	0.99	1.04	1.23
MARCH	1.13	0.94	1.00	1.13
APRIL	1.05	0.91	0.97	1.08
MAY	1.01	0.86	0.92	1.01
JUNE	0.98	0.85	0.91	0.98
JULY	0.92	0.78	0.88	0.97
AUGUST	0.88	0.77	0.80	0.90
SEPTEMBER	1.03	0.88	0.91	1.00
OCTOBER	1.06	0.90	0.98	1.07
NOVEMBER	1.10	0.95	1.03	1.17
DECEMBER	1.13	0.98	1.11	1.39

Land Use: 221
Multifamily Housing (Mid-Rise)

Description

Mid-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have between three and 10 levels (floors). Multifamily housing (low-rise) (Land Use 220), multifamily housing (high-rise) (Land Use 222), off-campus student apartment (Land Use 225), and mid-rise residential with 1st-floor commercial (Land Use 231) are related land uses.

Additional Data

In prior editions of *Trip Generation Manual*, the mid-rise multifamily housing sites were further divided into rental and condominium categories. An investigation of vehicle trip data found no clear differences in trip making patterns between the rental and condominium sites within the ITE database. As more data are compiled for future editions, this land use classification can be reinvestigated.

For the six sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.46 residents per occupied dwelling unit.

For the five sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 95.7 percent of the total dwelling units were occupied.

Time-of-day distribution data for this land use are presented in Appendix A. For the eight general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:00 and 8:00 a.m. and 4:45 and 5:45 p.m., respectively.

For the four dense multi-use urban sites with 24-hour count data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:15 and 8:15 a.m. and 4:15 and 5:15 p.m., respectively. For the three center city core sites with 24-hour count data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 6:45 and 7:45 a.m. and 5:00 and 6:00 p.m., respectively.

For the six sites for which data were provided for both occupied dwelling units and residents, there was an average of 2.46 residents per occupied dwelling unit.

For the five sites for which data were provided for both occupied dwelling units and total dwelling units, an average of 95.7 percent of the units were occupied.

The average numbers of person trips per vehicle trip at the five center city core sites at which both person trip and vehicle trip data were collected were as follows:

- 1.84 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 1.94 during Weekday, AM Peak Hour of Generator
- 2.07 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 2.59 during Weekday, PM Peak Hour of Generator

The average numbers of person trips per vehicle trip at the 32 dense multi-use urban sites at which both person trip and vehicle trip data were collected were as follows:

- 1.90 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 1.90 during Weekday, AM Peak Hour of Generator
- 2.00 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 2.08 during Weekday, PM Peak Hour of Generator

The average numbers of person trips per vehicle trip at the 13 general urban/suburban sites at which both person trip and vehicle trip data were collected were as follows:

- 1.56 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 1.88 during Weekday, AM Peak Hour of Generator
- 1.70 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 2.07 during Weekday, PM Peak Hour of Generator

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), British Columbia (CAN), California, Delaware, District of Columbia, Florida, Georgia, Illinois, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, Ontario, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Utah, Virginia, and Wisconsin.

Source Numbers

168, 188, 204, 305, 306, 321, 357, 390, 436, 525, 530, 579, 638, 818, 857, 866, 901, 904, 910, 912, 918, 934, 936, 939, 944, 947, 948, 949, 959, 963, 964, 966, 967, 969, 970

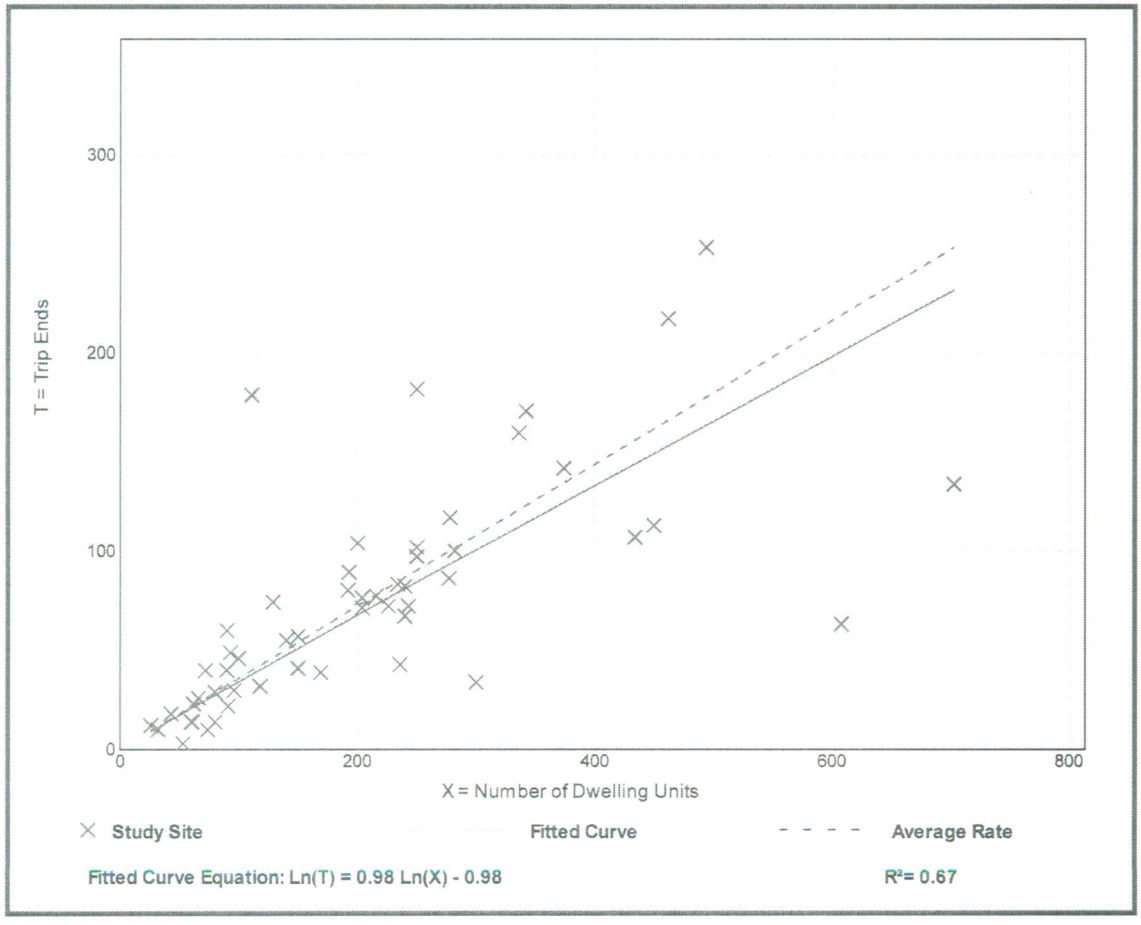
Multifamily Housing (Mid-Rise)
(221)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	53
Avg. Num. of Dwelling Units:	207
Directional Distribution:	26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.36	0.06 - 1.61	0.19

Data Plot and Equation



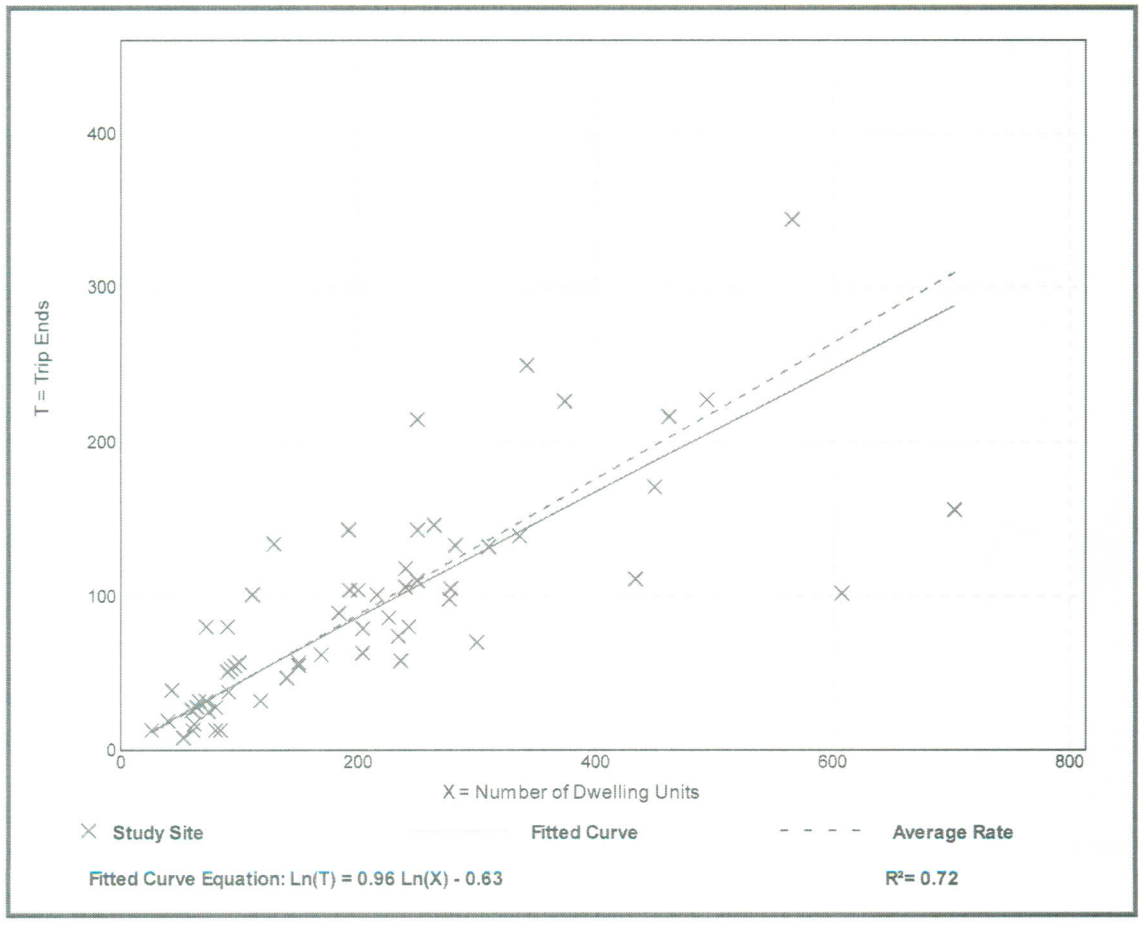
Multifamily Housing (Mid-Rise)
(221)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,** **Peak Hour of Adjacent Street Traffic,** **One Hour Between 4 and 6 p.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	60
Avg. Num. of Dwelling Units:	208
Directional Distribution:	61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.44	0.15 - 1.11	0.19

Data Plot and Equation



Multifamily Housing (Mid-Rise)
(221)

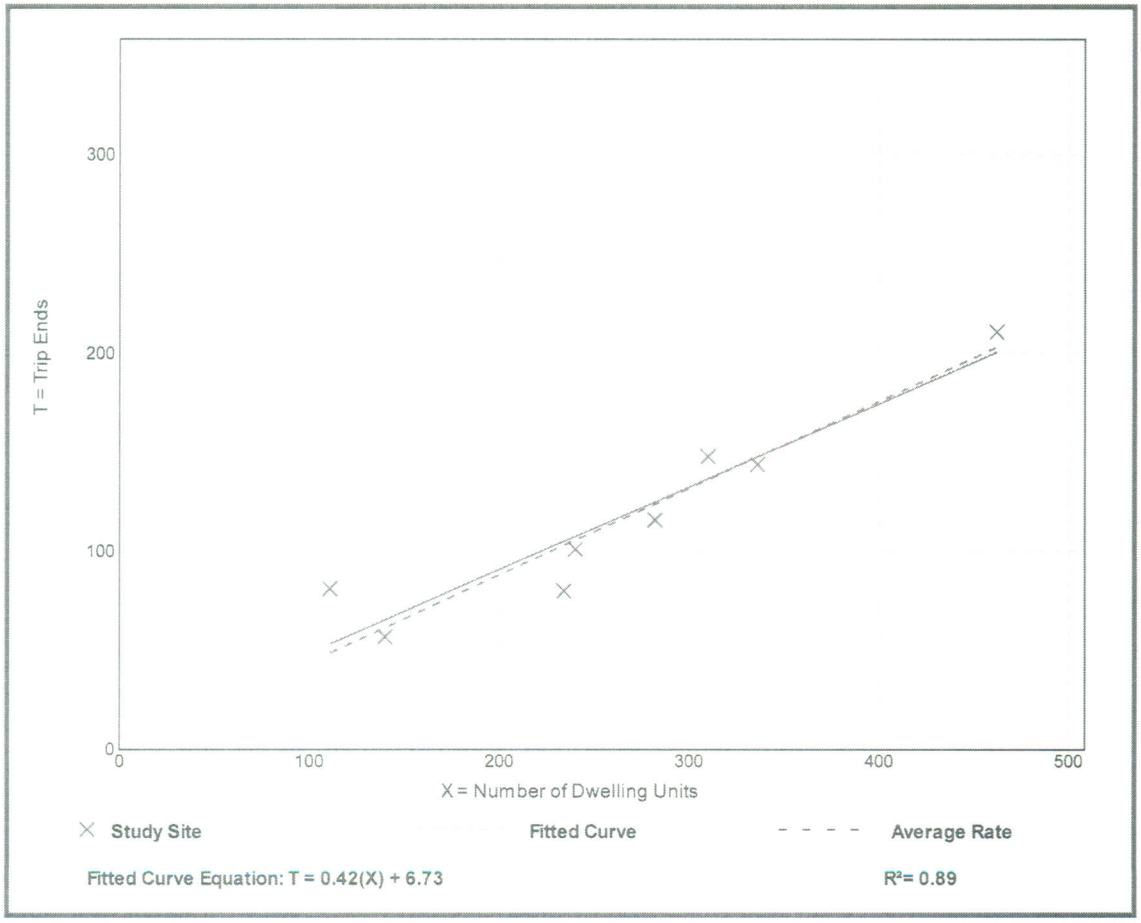
Vehicle Trip Ends vs: Dwelling Units
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 8
Avg. Num. of Dwelling Units: 264
Directional Distribution: 49% entering, 51% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.44	0.34 - 0.73	0.08

Data Plot and Equation



Parking Generation Manual

5th Edition

JANUARY 2019

INSTITUTE OF TRANSPORTATION ENGINEERS

Land Use: 221 Multifamily Housing (Mid-Rise)

Description

Mid-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and with between three and 10 levels (floors) of residence. Multifamily housing (low-rise) (Land Use 220), multifamily housing (high-rise) (Land Use 222), and affordable housing (Land Use 223) are related land uses.

Time of Day Distribution for Parking Demand

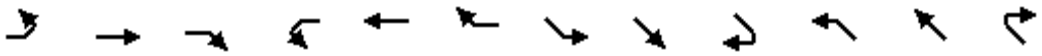
The following table presents a time-of-day distribution of parking demand on a weekday (one general urban/suburban study site), a Saturday (two general urban/suburban study sites), and a Sunday (one dense multi-use urban study site).

	Percent of Peak Parking Demand		
Hour Beginning	Weekday	Saturday	Sunday
12:00–4:00 a.m.	100	100	100
5:00 a.m.	94	99	–
6:00 a.m.	83	97	–
7:00 a.m.	71	95	–
8:00 a.m.	61	88	–
9:00 a.m.	55	83	–
10:00 a.m.	54	75	–
11:00 a.m.	53	71	–
12:00 p.m.	50	68	–
1:00 p.m.	49	66	33
2:00 p.m.	49	70	40
3:00 p.m.	50	69	27
4:00 p.m.	58	72	13
5:00 p.m.	64	74	33
6:00 p.m.	67	74	60
7:00 p.m.	70	73	67
8:00 p.m.	76	75	47
9:00 p.m.	83	78	53
10:00 p.m.	90	82	73
11:00 p.m.	93	88	93

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	444	222	0	565	61	0
Future Volume (vph)	444	222	0	565	61	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			6.1	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.96			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	1779			1863	1770	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	1779			1863	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	483	241	0	614	66	0
RTOR Reduction (vph)	6	0	0	0	0	0
Lane Group Flow (vph)	718	0	0	614	66	0
Turn Type	NA			NA	Prot	
Protected Phases	2			2	4	
Permitted Phases			2			
Actuated Green, G (s)	72.2			72.2	7.7	
Effective Green, g (s)	72.2			72.2	7.7	
Actuated g/C Ratio	0.80			0.80	0.09	
Clearance Time (s)	6.1			6.1	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1427			1494	151	
v/s Ratio Prot	c0.40			0.33	c0.04	
v/s Ratio Perm						
v/c Ratio	0.50			0.41	0.44	
Uniform Delay, d1	3.0			2.6	39.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.3			0.8	2.0	
Delay (s)	4.2			3.5	41.1	
Level of Service	A			A	D	
Approach Delay (s)	4.2			3.5	41.1	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.1
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	269	261	17	76	219	202	177	84	110	0	127	34
Future Volume (vph)	269	261	17	76	219	202	177	84	110	0	127	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			3.0		5.0	5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	0.99			0.95		1.00	0.91			0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1846			1747		1770	1704			1810	
Flt Permitted	0.46	1.00			0.92		0.64	1.00			1.00	
Satd. Flow (perm)	861	1846			1626		1185	1704			1810	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	292	284	18	83	238	220	192	91	120	0	138	37
RTOR Reduction (vph)	0	3	0	0	36	0	0	72	0	0	14	0
Lane Group Flow (vph)	292	299	0	0	505	0	192	139	0	0	161	0
Turn Type	Perm	NA		D.P+P	NA		Perm	NA			NA	
Protected Phases		2		1	1 2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	24.6	24.6			35.8		15.6	15.6			15.6	
Effective Green, g (s)	24.6	24.6			35.8		15.6	15.6			15.6	
Actuated g/C Ratio	0.38	0.38			0.56		0.24	0.24			0.24	
Clearance Time (s)	5.0	5.0					5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	328	705			924		287	412			438	
v/s Ratio Prot		0.16			c0.10			0.08			0.09	
v/s Ratio Perm	c0.34				0.21		c0.16					
v/c Ratio	0.89	0.42			0.55		0.67	0.34			0.37	
Uniform Delay, d1	18.6	14.7			9.1		22.1	20.1			20.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	24.5	0.4			0.7		5.8	0.5			0.5	
Delay (s)	43.1	15.1			9.8		27.9	20.6			20.8	
Level of Service	D	B			A		C	C			C	
Approach Delay (s)		28.9			9.8			24.1			20.8	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	64.4	Sum of lost time (s)	13.0
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	390	27	619	458	0	256
Future Volume (Veh/h)	390	27	619	458	0	256
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	424	29	673	498	0	278
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	867					
pX, platoon unblocked						
vC, conflicting volume			453		2282	226
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			453		2282	226
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			39		100	64
cM capacity (veh/h)			1104		13	776

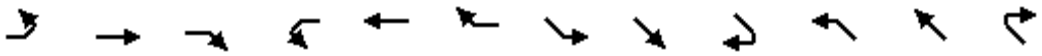
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	283	170	673	498	278
Volume Left	0	0	673	0	0
Volume Right	0	29	0	0	278
cSH	1700	1700	1104	1700	776
Volume to Capacity	0.17	0.10	0.61	0.29	0.36
Queue Length 95th (ft)	0	0	108	0	41
Control Delay (s)	0.0	0.0	13.2	0.0	12.2
Lane LOS			B		B
Approach Delay (s)	0.0		7.6		12.2
Approach LOS					B

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	398	168	0	421	342	17
Future Volume (vph)	398	168	0	421	342	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			6.1	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.96			1.00	0.99	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	1788			1863	1767	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	1788			1863	1767	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	433	183	0	458	372	18
RTOR Reduction (vph)	11	0	0	0	3	0
Lane Group Flow (vph)	605	0	0	458	387	0
Turn Type	NA			NA	Prot	
Protected Phases	2			2	4	
Permitted Phases			2			
Actuated Green, G (s)	53.7			53.7	26.2	
Effective Green, g (s)	53.7			53.7	26.2	
Actuated g/C Ratio	0.60			0.60	0.29	
Clearance Time (s)	6.1			6.1	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1066			1111	514	
v/s Ratio Prot	c0.34			0.25	c0.22	
v/s Ratio Perm						
v/c Ratio	0.57			0.41	0.75	
Uniform Delay, d1	11.1			9.7	29.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	2.2			1.1	6.2	
Delay (s)	13.3			10.8	35.1	
Level of Service	B			B	D	
Approach Delay (s)	13.3			10.8	35.1	
Approach LOS	B			B	D	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.1
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	116	183	0	67	298	183	154	38	164	19	212	38
Future Volume (vph)	116	183	0	67	298	183	154	38	164	19	212	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			3.0		5.0	5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	1.00			0.95		1.00	0.88			0.98	
Flt Protected	0.95	1.00			0.99		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1863			1768		1770	1636			1821	
Flt Permitted	0.44	1.00			0.95		0.46	1.00			0.97	
Satd. Flow (perm)	818	1863			1698		853	1636			1767	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	199	0	73	324	199	167	41	178	21	230	41
RTOR Reduction (vph)	0	0	0	0	27	0	0	131	0	0	9	0
Lane Group Flow (vph)	126	199	0	0	569	0	167	88	0	0	283	0
Turn Type	Perm	NA		D.P+P	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	21.8	21.8			33.3		16.8	16.8			16.8	
Effective Green, g (s)	21.8	21.8			33.3		16.8	16.8			16.8	
Actuated g/C Ratio	0.35	0.35			0.53		0.27	0.27			0.27	
Clearance Time (s)	5.0	5.0					5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	282	643			908		227	435			470	
v/s Ratio Prot		0.11			c0.11			0.05				
v/s Ratio Perm	0.15				c0.22		c0.20				0.16	
v/c Ratio	0.45	0.31			0.63		0.74	0.20			0.60	
Uniform Delay, d1	16.0	15.1			10.5		21.1	18.0			20.2	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	1.1	0.3			1.4		11.7	0.2			2.2	
Delay (s)	17.1	15.4			11.9		32.8	18.2			22.4	
Level of Service	B	B			B		C	B			C	
Approach Delay (s)		16.1			11.9			24.5			22.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	63.1	Sum of lost time (s)	13.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	325	0	292	471	0	628
Future Volume (Veh/h)	325	0	292	471	0	628
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	353	0	317	512	0	683
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	867					
pX, platoon unblocked						
vC, conflicting volume			353		1499	176
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			353		1499	176
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			74		100	18
cM capacity (veh/h)			1202		83	836

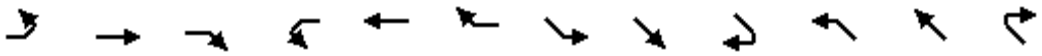
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	235	118	317	512	683
Volume Left	0	0	317	0	0
Volume Right	0	0	0	0	683
cSH	1700	1700	1202	1700	836
Volume to Capacity	0.14	0.07	0.26	0.30	0.82
Queue Length 95th (ft)	0	0	27	0	227
Control Delay (s)	0.0	0.0	9.1	0.0	25.4
Lane LOS			A		D
Approach Delay (s)	0.0		3.5		25.4
Approach LOS					D

Intersection Summary			
Average Delay	10.8		
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	442	133	0	470	245	0
Future Volume (vph)	442	133	0	470	245	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			6.1	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.97			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	1804			1863	1770	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	1804			1863	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	480	145	0	511	266	0
RTOR Reduction (vph)	9	0	0	0	0	0
Lane Group Flow (vph)	616	0	0	511	266	0
Turn Type	NA			NA	Prot	
Protected Phases	2			2	4	
Permitted Phases			2			
Actuated Green, G (s)	43.7			43.7	16.2	
Effective Green, g (s)	43.7			43.7	16.2	
Actuated g/C Ratio	0.62			0.62	0.23	
Clearance Time (s)	6.1			6.1	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1126			1163	409	
v/s Ratio Prot	c0.34			0.27	c0.15	
v/s Ratio Perm						
v/c Ratio	0.55			0.44	0.65	
Uniform Delay, d1	7.5			6.8	24.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.9			1.2	3.7	
Delay (s)	9.4			8.0	28.0	
Level of Service	A			A	C	
Approach Delay (s)	9.4			8.0	28.0	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.1
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	47	102	8	32	132	257	164	62	55	0	85	85
Future Volume (vph)	47	102	8	32	132	257	164	62	55	0	85	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			3.0		5.0	5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	0.99			0.92		1.00	0.93			0.93	
Flt Protected	0.95	1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1842			1703		1770	1731			1737	
Flt Permitted	0.50	1.00			0.99		0.64	1.00			1.00	
Satd. Flow (perm)	931	1842			1686		1195	1731			1737	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	111	9	35	143	279	178	67	60	0	92	92
RTOR Reduction (vph)	0	4	0	0	87	0	0	45	0	0	54	0
Lane Group Flow (vph)	51	116	0	0	370	0	178	82	0	0	130	0
Turn Type	Perm	NA		D.P+P	NA		Perm	NA			NA	
Protected Phases		2		1	1 2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	20.2	20.2			30.0		14.6	14.6			14.6	
Effective Green, g (s)	20.2	20.2			30.0		14.6	14.6			14.6	
Actuated g/C Ratio	0.35	0.35			0.52		0.25	0.25			0.25	
Clearance Time (s)	5.0	5.0					5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	326	645			881		302	438			440	
v/s Ratio Prot		0.06			c0.07			0.05			0.07	
v/s Ratio Perm	0.05				c0.15		c0.15					
v/c Ratio	0.16	0.18			0.42		0.59	0.19			0.30	
Uniform Delay, d1	12.8	13.0			8.5		18.9	16.9			17.4	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.2	0.1			0.3		2.9	0.2			0.4	
Delay (s)	13.1	13.1			8.8		21.8	17.1			17.7	
Level of Service	B	B			A		C	B			B	
Approach Delay (s)		13.1			8.8			19.8			17.7	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	57.6	Sum of lost time (s)	13.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	434	7	624	413	0	287
Future Volume (Veh/h)	434	7	624	413	0	287
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	472	8	678	449	0	312
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	867					
pX, platoon unblocked						
vC, conflicting volume			480		2281	240
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			480		2281	240
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			37		100	59
cM capacity (veh/h)			1079		12	761

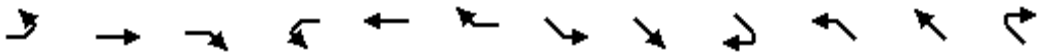
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	315	165	678	449	312
Volume Left	0	0	678	0	0
Volume Right	0	8	0	0	312
cSH	1700	1700	1079	1700	761
Volume to Capacity	0.19	0.10	0.63	0.26	0.41
Queue Length 95th (ft)	0	0	116	0	50
Control Delay (s)	0.0	0.0	13.8	0.0	13.0
Lane LOS			B		B
Approach Delay (s)	0.0		8.3		13.0
Approach LOS					B

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	448	224	0	571	62	0
Future Volume (vph)	448	224	0	571	62	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			6.1	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.96			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	1779			1863	1770	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	1779			1863	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	487	243	0	621	67	0
RTOR Reduction (vph)	6	0	0	0	0	0
Lane Group Flow (vph)	724	0	0	621	67	0
Turn Type	NA			NA	Prot	
Protected Phases	2			2	4	
Permitted Phases			2			
Actuated Green, G (s)	72.2			72.2	7.7	
Effective Green, g (s)	72.2			72.2	7.7	
Actuated g/C Ratio	0.80			0.80	0.09	
Clearance Time (s)	6.1			6.1	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1427			1494	151	
v/s Ratio Prot	c0.41			0.33	c0.04	
v/s Ratio Perm						
v/c Ratio	0.51			0.42	0.44	
Uniform Delay, d1	3.0			2.6	39.1	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.3			0.9	2.1	
Delay (s)	4.3			3.5	41.2	
Level of Service	A			A	D	
Approach Delay (s)	4.3			3.5	41.2	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.1
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	272	264	17	77	221	204	179	85	111	0	128	34
Future Volume (vph)	272	264	17	77	221	204	179	85	111	0	128	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			3.0		5.0	5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	0.99			0.95		1.00	0.91			0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1846			1747		1770	1704			1810	
Flt Permitted	0.46	1.00			0.92		0.63	1.00			1.00	
Satd. Flow (perm)	857	1846			1623		1177	1704			1810	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	296	287	18	84	240	222	195	92	121	0	139	37
RTOR Reduction (vph)	0	3	0	0	35	0	0	72	0	0	14	0
Lane Group Flow (vph)	296	302	0	0	511	0	195	141	0	0	162	0
Turn Type	Perm	NA		D.P+P	NA		Perm	NA			NA	
Protected Phases		2		1	1 2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	25.1	25.1			36.3		15.7	15.7			15.7	
Effective Green, g (s)	25.1	25.1			36.3		15.7	15.7			15.7	
Actuated g/C Ratio	0.39	0.39			0.56		0.24	0.24			0.24	
Clearance Time (s)	5.0	5.0					5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	330	712			927		284	411			437	
v/s Ratio Prot		0.16			c0.09			0.08			0.09	
v/s Ratio Perm	c0.35				0.21		c0.17					
v/c Ratio	0.90	0.42			0.55		0.69	0.34			0.37	
Uniform Delay, d1	18.7	14.6			9.2		22.4	20.4			20.5	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	25.3	0.4			0.7		6.7	0.5			0.5	
Delay (s)	44.0	15.1			9.9		29.1	20.9			21.1	
Level of Service	D	B			A		C	C			C	
Approach Delay (s)		29.3			9.9			24.8			21.1	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	394	27	625	463	0	259
Future Volume (Veh/h)	394	27	625	463	0	259
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	428	29	679	503	0	282
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	867					
pX, platoon unblocked						
vC, conflicting volume			457		2304	228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			457		2304	228
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			38		100	64
cM capacity (veh/h)			1100		12	774

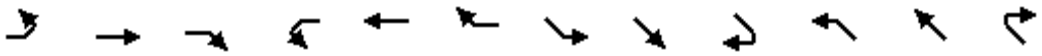
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	285	172	679	503	282
Volume Left	0	0	679	0	0
Volume Right	0	29	0	0	282
cSH	1700	1700	1100	1700	774
Volume to Capacity	0.17	0.10	0.62	0.30	0.36
Queue Length 95th (ft)	0	0	111	0	42
Control Delay (s)	0.0	0.0	13.4	0.0	12.3
Lane LOS			B		B
Approach Delay (s)	0.0		7.7		12.3
Approach LOS					B

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	402	170	0	425	345	17
Future Volume (vph)	402	170	0	425	345	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			6.1	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.96			1.00	0.99	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	1788			1863	1767	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	1788			1863	1767	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	437	185	0	462	375	18
RTOR Reduction (vph)	11	0	0	0	3	0
Lane Group Flow (vph)	611	0	0	462	390	0
Turn Type	NA			NA	Prot	
Protected Phases	2			2	4	
Permitted Phases			2			
Actuated Green, G (s)	53.5			53.5	26.4	
Effective Green, g (s)	53.5			53.5	26.4	
Actuated g/C Ratio	0.59			0.59	0.29	
Clearance Time (s)	6.1			6.1	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1062			1107	518	
v/s Ratio Prot	c0.34			0.25	c0.22	
v/s Ratio Perm						
v/c Ratio	0.58			0.42	0.75	
Uniform Delay, d1	11.2			9.8	28.8	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	2.3			1.2	6.1	
Delay (s)	13.5			11.0	35.0	
Level of Service	B			B	C	
Approach Delay (s)	13.5			11.0	35.0	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.1
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	117	185	0	68	301	185	156	38	166	19	214	38
Future Volume (vph)	117	185	0	68	301	185	156	38	166	19	214	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			3.0		5.0	5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	1.00			0.95		1.00	0.88			0.98	
Flt Protected	0.95	1.00			0.99		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1863			1768		1770	1635			1821	
Flt Permitted	0.44	1.00			0.95		0.45	1.00			0.97	
Satd. Flow (perm)	814	1863			1697		846	1635			1767	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	201	0	74	327	201	170	41	180	21	233	41
RTOR Reduction (vph)	0	0	0	0	27	0	0	132	0	0	9	0
Lane Group Flow (vph)	127	201	0	0	575	0	170	89	0	0	286	0
Turn Type	Perm	NA		D.P+P	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	21.8	21.8			33.4		16.9	16.9			16.9	
Effective Green, g (s)	21.8	21.8			33.4		16.9	16.9			16.9	
Actuated g/C Ratio	0.34	0.34			0.53		0.27	0.27			0.27	
Clearance Time (s)	5.0	5.0					5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	280	641			908		225	436			471	
v/s Ratio Prot		0.11			c0.12			0.05				
v/s Ratio Perm	0.16				c0.22		c0.20				0.16	
v/c Ratio	0.45	0.31			0.63		0.76	0.20			0.61	
Uniform Delay, d1	16.1	15.3			10.6		21.3	18.0			20.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	1.2	0.3			1.4		13.4	0.2			2.2	
Delay (s)	17.3	15.5			12.1		34.7	18.2			22.5	
Level of Service	B	B			B		C	B			C	
Approach Delay (s)		16.2			12.1			25.4			22.5	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	63.3	Sum of lost time (s)	13.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	328	0	295	476	0	634
Future Volume (Veh/h)	328	0	295	476	0	634
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	357	0	321	517	0	689
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	867					
pX, platoon unblocked						
vC, conflicting volume			357		1516	178
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			357		1516	178
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			73		100	17
cM capacity (veh/h)			1198		81	834

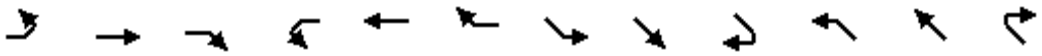
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	238	119	321	517	689
Volume Left	0	0	321	0	0
Volume Right	0	0	0	0	689
cSH	1700	1700	1198	1700	834
Volume to Capacity	0.14	0.07	0.27	0.30	0.83
Queue Length 95th (ft)	0	0	27	0	235
Control Delay (s)	0.0	0.0	9.1	0.0	26.2
Lane LOS			A		D
Approach Delay (s)	0.0		3.5		26.2
Approach LOS					D

Intersection Summary			
Average Delay	11.1		
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	446	134	0	475	247	0
Future Volume (vph)	446	134	0	475	247	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			6.1	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.97			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	1805			1863	1770	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	1805			1863	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	485	146	0	516	268	0
RTOR Reduction (vph)	9	0	0	0	0	0
Lane Group Flow (vph)	622	0	0	516	268	0
Turn Type	NA			NA	Prot	
Protected Phases	2			2	4	
Permitted Phases			2			
Actuated Green, G (s)	43.6			43.6	16.3	
Effective Green, g (s)	43.6			43.6	16.3	
Actuated g/C Ratio	0.62			0.62	0.23	
Clearance Time (s)	6.1			6.1	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1124			1160	412	
v/s Ratio Prot	c0.34			0.28	c0.15	
v/s Ratio Perm						
v/c Ratio	0.55			0.44	0.65	
Uniform Delay, d1	7.6			6.9	24.3	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	2.0			1.2	3.7	
Delay (s)	9.6			8.1	27.9	
Level of Service	A			A	C	
Approach Delay (s)	9.6			8.1	27.9	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.1
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	47	103	8	32	133	260	166	63	56	0	86	86
Future Volume (vph)	47	103	8	32	133	260	166	63	56	0	86	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			3.0		5.0	5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	0.99			0.92		1.00	0.93			0.93	
Flt Protected	0.95	1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1842			1703		1770	1731			1737	
Flt Permitted	0.50	1.00			0.99		0.64	1.00			1.00	
Satd. Flow (perm)	925	1842			1686		1193	1731			1737	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	112	9	35	145	283	180	68	61	0	93	93
RTOR Reduction (vph)	0	4	0	0	88	0	0	45	0	0	54	0
Lane Group Flow (vph)	51	117	0	0	375	0	180	84	0	0	132	0
Turn Type	Perm	NA		D.P+P	NA		Perm	NA			NA	
Protected Phases		2		1	1 2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	20.2	20.2			30.1		14.9	14.9			14.9	
Effective Green, g (s)	20.2	20.2			30.1		14.9	14.9			14.9	
Actuated g/C Ratio	0.35	0.35			0.52		0.26	0.26			0.26	
Clearance Time (s)	5.0	5.0					5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	322	641			877		306	444			446	
v/s Ratio Prot		0.06			c0.07			0.05			0.08	
v/s Ratio Perm	0.06				c0.15		c0.15					
v/c Ratio	0.16	0.18			0.43		0.59	0.19			0.30	
Uniform Delay, d1	13.0	13.2			8.6		18.9	16.8			17.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.2	0.1			0.3		2.9	0.2			0.4	
Delay (s)	13.3	13.3			9.0		21.7	17.0			17.7	
Level of Service	B	B			A		C	B			B	
Approach Delay (s)		13.3			9.0			19.8			17.7	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	438	7	630	417	0	290
Future Volume (Veh/h)	438	7	630	417	0	290
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	476	8	685	453	0	315
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	867					
pX, platoon unblocked						
vC, conflicting volume			484		2303	242
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			484		2303	242
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			36		100	58
cM capacity (veh/h)			1075		12	759

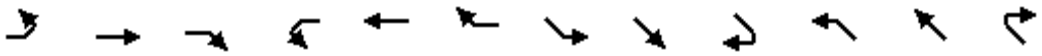
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	317	167	685	453	315
Volume Left	0	0	685	0	0
Volume Right	0	8	0	0	315
cSH	1700	1700	1075	1700	759
Volume to Capacity	0.19	0.10	0.64	0.27	0.42
Queue Length 95th (ft)	0	0	120	0	51
Control Delay (s)	0.0	0.0	14.0	0.0	13.1
Lane LOS			B		B
Approach Delay (s)	0.0		8.4		13.1
Approach LOS					B

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	448	224	0	571	63	0
Future Volume (vph)	448	224	0	571	63	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			6.1	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.96			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	1779			1863	1770	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	1779			1863	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	487	243	0	621	68	0
RTOR Reduction (vph)	6	0	0	0	0	0
Lane Group Flow (vph)	724	0	0	621	68	0
Turn Type	NA			NA	Prot	
Protected Phases	2			2	4	
Permitted Phases			2			
Actuated Green, G (s)	72.1			72.1	7.8	
Effective Green, g (s)	72.1			72.1	7.8	
Actuated g/C Ratio	0.80			0.80	0.09	
Clearance Time (s)	6.1			6.1	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1425			1492	153	
v/s Ratio Prot	c0.41			0.33	c0.04	
v/s Ratio Perm						
v/c Ratio	0.51			0.42	0.44	
Uniform Delay, d1	3.0			2.7	39.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.3			0.9	2.1	
Delay (s)	4.3			3.5	41.1	
Level of Service	A			A	D	
Approach Delay (s)	4.3			3.5	41.1	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.1
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	272	264	17	77	221	204	179	85	111	0	128	34
Future Volume (vph)	272	264	17	77	221	204	179	85	111	0	128	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			3.0		5.0	5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	0.99			0.95		1.00	0.91			0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1846			1747		1770	1704			1810	
Flt Permitted	0.46	1.00			0.92		0.63	1.00			1.00	
Satd. Flow (perm)	857	1846			1623		1177	1704			1810	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	296	287	18	84	240	222	195	92	121	0	139	37
RTOR Reduction (vph)	0	3	0	0	35	0	0	72	0	0	14	0
Lane Group Flow (vph)	296	302	0	0	511	0	195	141	0	0	162	0
Turn Type	Perm	NA		D.P+P	NA		Perm	NA			NA	
Protected Phases		2		1	1 2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	25.1	25.1			36.3		15.7	15.7			15.7	
Effective Green, g (s)	25.1	25.1			36.3		15.7	15.7			15.7	
Actuated g/C Ratio	0.39	0.39			0.56		0.24	0.24			0.24	
Clearance Time (s)	5.0	5.0					5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	330	712			927		284	411			437	
v/s Ratio Prot		0.16			c0.09			0.08			0.09	
v/s Ratio Perm	c0.35				0.21		c0.17					
v/c Ratio	0.90	0.42			0.55		0.69	0.34			0.37	
Uniform Delay, d1	18.7	14.6			9.2		22.4	20.4			20.5	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	25.3	0.4			0.7		6.7	0.5			0.5	
Delay (s)	44.0	15.1			9.9		29.1	20.9			21.1	
Level of Service	D	B			A		C	C			C	
Approach Delay (s)		29.3			9.9			24.8			21.1	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	394	27	627	463	0	262
Future Volume (Veh/h)	394	27	627	463	0	262
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	428	29	682	503	0	285
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	867					
pX, platoon unblocked						
vC, conflicting volume			457		2310	228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			457		2310	228
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			38		100	63
cM capacity (veh/h)			1100		12	774

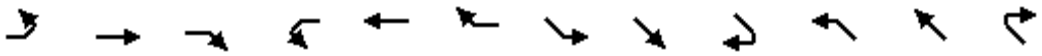
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	285	172	682	503	285
Volume Left	0	0	682	0	0
Volume Right	0	29	0	0	285
cSH	1700	1700	1100	1700	774
Volume to Capacity	0.17	0.10	0.62	0.30	0.37
Queue Length 95th (ft)	0	0	113	0	43
Control Delay (s)	0.0	0.0	13.5	0.0	12.3
Lane LOS			B		B
Approach Delay (s)	0.0		7.7		12.3
Approach LOS					B

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	402	171	0	425	345	17
Future Volume (vph)	402	171	0	425	345	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			6.1	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.96			1.00	0.99	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	1788			1863	1767	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	1788			1863	1767	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	437	186	0	462	375	18
RTOR Reduction (vph)	11	0	0	0	3	0
Lane Group Flow (vph)	612	0	0	462	390	0
Turn Type	NA			NA	Prot	
Protected Phases	2			2	4	
Permitted Phases			2			
Actuated Green, G (s)	53.5			53.5	26.4	
Effective Green, g (s)	53.5			53.5	26.4	
Actuated g/C Ratio	0.59			0.59	0.29	
Clearance Time (s)	6.1			6.1	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1062			1107	518	
v/s Ratio Prot	c0.34			0.25	c0.22	
v/s Ratio Perm						
v/c Ratio	0.58			0.42	0.75	
Uniform Delay, d1	11.3			9.8	28.8	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	2.3			1.2	6.1	
Delay (s)	13.5			11.0	35.0	
Level of Service	B			B	C	
Approach Delay (s)	13.5			11.0	35.0	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.1
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	117	185	0	68	301	185	156	38	166	19	214	38
Future Volume (vph)	117	185	0	68	301	185	156	38	166	19	214	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			3.0		5.0	5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	1.00			0.95		1.00	0.88			0.98	
Flt Protected	0.95	1.00			0.99		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1863			1768		1770	1635			1821	
Flt Permitted	0.44	1.00			0.95		0.45	1.00			0.97	
Satd. Flow (perm)	814	1863			1697		846	1635			1767	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	201	0	74	327	201	170	41	180	21	233	41
RTOR Reduction (vph)	0	0	0	0	27	0	0	132	0	0	9	0
Lane Group Flow (vph)	127	201	0	0	575	0	170	89	0	0	286	0
Turn Type	Perm	NA		D.P+P	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	21.8	21.8			33.4		16.9	16.9			16.9	
Effective Green, g (s)	21.8	21.8			33.4		16.9	16.9			16.9	
Actuated g/C Ratio	0.34	0.34			0.53		0.27	0.27			0.27	
Clearance Time (s)	5.0	5.0					5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	280	641			908		225	436			471	
v/s Ratio Prot		0.11			c0.12			0.05				
v/s Ratio Perm	0.16				c0.22		c0.20				0.16	
v/c Ratio	0.45	0.31			0.63		0.76	0.20			0.61	
Uniform Delay, d1	16.1	15.3			10.6		21.3	18.0			20.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	1.2	0.3			1.4		13.4	0.2			2.2	
Delay (s)	17.3	15.5			12.1		34.7	18.2			22.5	
Level of Service	B	B			B		C	B			C	
Approach Delay (s)		16.2			12.1			25.4			22.5	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	63.3	Sum of lost time (s)	13.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	328	0	298	476	0	637
Future Volume (Veh/h)	328	0	298	476	0	637
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	357	0	324	517	0	692
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	867					
pX, platoon unblocked						
vC, conflicting volume			357		1522	178
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			357		1522	178
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			73		100	17
cM capacity (veh/h)			1198		80	834

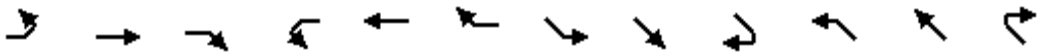
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	238	119	324	517	692
Volume Left	0	0	324	0	0
Volume Right	0	0	0	0	692
cSH	1700	1700	1198	1700	834
Volume to Capacity	0.14	0.07	0.27	0.30	0.83
Queue Length 95th (ft)	0	0	28	0	238
Control Delay (s)	0.0	0.0	9.1	0.0	26.5
Lane LOS			A		D
Approach Delay (s)	0.0		3.5		26.5
Approach LOS					D

Intersection Summary			
Average Delay	11.3		
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	446	134	0	475	248	0
Future Volume (vph)	446	134	0	475	248	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1			6.1	4.0	
Lane Util. Factor	1.00			1.00	1.00	
Frt	0.97			1.00	1.00	
Flt Protected	1.00			1.00	0.95	
Satd. Flow (prot)	1805			1863	1770	
Flt Permitted	1.00			1.00	0.95	
Satd. Flow (perm)	1805			1863	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	485	146	0	516	270	0
RTOR Reduction (vph)	9	0	0	0	0	0
Lane Group Flow (vph)	622	0	0	516	270	0
Turn Type	NA			NA	Prot	
Protected Phases	2			2	4	
Permitted Phases			2			
Actuated Green, G (s)	43.5			43.5	16.4	
Effective Green, g (s)	43.5			43.5	16.4	
Actuated g/C Ratio	0.62			0.62	0.23	
Clearance Time (s)	6.1			6.1	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1121			1157	414	
v/s Ratio Prot	c0.34			0.28	c0.15	
v/s Ratio Perm						
v/c Ratio	0.55			0.45	0.65	
Uniform Delay, d1	7.7			6.9	24.2	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	2.0			1.2	3.7	
Delay (s)	9.6			8.2	27.9	
Level of Service	A			A	C	
Approach Delay (s)	9.6			8.2	27.9	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.1
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	47	103	8	32	133	260	166	63	56	0	86	86
Future Volume (vph)	47	103	8	32	133	260	166	63	56	0	86	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			3.0		5.0	5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Frt	1.00	0.99			0.92		1.00	0.93			0.93	
Flt Protected	0.95	1.00			1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	1842			1703		1770	1731			1737	
Flt Permitted	0.50	1.00			0.99		0.64	1.00			1.00	
Satd. Flow (perm)	925	1842			1686		1193	1731			1737	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	112	9	35	145	283	180	68	61	0	93	93
RTOR Reduction (vph)	0	4	0	0	88	0	0	45	0	0	54	0
Lane Group Flow (vph)	51	117	0	0	375	0	180	84	0	0	132	0
Turn Type	Perm	NA		D.P+P	NA		Perm	NA			NA	
Protected Phases		2		1	1 2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	20.2	20.2			30.1		14.9	14.9			14.9	
Effective Green, g (s)	20.2	20.2			30.1		14.9	14.9			14.9	
Actuated g/C Ratio	0.35	0.35			0.52		0.26	0.26			0.26	
Clearance Time (s)	5.0	5.0					5.0	5.0			5.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	322	641			877		306	444			446	
v/s Ratio Prot		0.06			c0.07			0.05			0.08	
v/s Ratio Perm	0.06				c0.15		c0.15					
v/c Ratio	0.16	0.18			0.43		0.59	0.19			0.30	
Uniform Delay, d1	13.0	13.2			8.6		18.9	16.8			17.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.2	0.1			0.3		2.9	0.2			0.4	
Delay (s)	13.3	13.3			9.0		21.7	17.0			17.7	
Level of Service	B	B			A		C	B			B	
Approach Delay (s)		13.3			9.0			19.8			17.7	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	438	7	633	417	0	293
Future Volume (Veh/h)	438	7	633	417	0	293
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	476	8	688	453	0	318
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	867					
pX, platoon unblocked						
vC, conflicting volume			484		2309	242
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			484		2309	242
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			36		100	58
cM capacity (veh/h)			1075		12	759

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	317	167	688	453	318
Volume Left	0	0	688	0	0
Volume Right	0	8	0	0	318
cSH	1700	1700	1075	1700	759
Volume to Capacity	0.19	0.10	0.64	0.27	0.42
Queue Length 95th (ft)	0	0	121	0	52
Control Delay (s)	0.0	0.0	14.1	0.0	13.1
Lane LOS			B		B
Approach Delay (s)	0.0		8.5		13.1
Approach LOS					B

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		