

Traffic Analysis For Oakland Pointe Apartments

JAMES CITY COUNTY, VIRGINIA

For:
Connelly Development, LLC

By:
**DRW Consultants, LLC
Midlothian, VA**

September 23, 2018

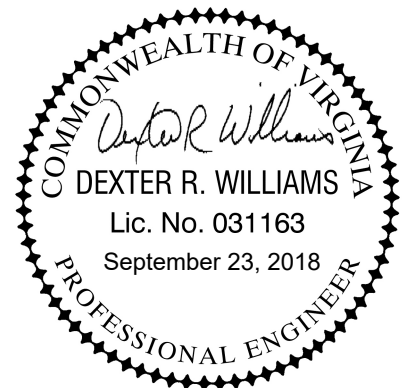
Traffic Analysis For Oakland Pointe Apartments

JAMES CITY COUNTY, VIRGINIA

For:
Connelly Development, LLC

By:
DRW Consultants, LLC
Midlothian, VA

September 23, 2018



FOREWORD

This traffic study is the latest update of the original November 20, 2017 study for Oakland Pointe Apartments.

Following are the revisions since the original study:

- 1. The eastbound left turn lane on Rt. 60 at Croaker Road will be reconstructed to have 400 feet of storage/100-foot taper. The original study had 300 feet storage/100-foot taper. The existing left turn lane has 200 feet storage.*
- 2. Oakland Pointe Apartments will have access only on Oakland Drive. The original study had access on Rt. 60 Richmond Road.*
- 3. The unsignalized crossover at Rt. 60/Oakland Drive will have median noses cut back and yield bar striping control in the crossover like other locations on Rt. 60. This is in addition to the westbound left turn lane on Rt. 60 at the crossover that was included in the original study.*
- 4. Traffic level of service at Rt. 60/Oakland Drive crossover is calculated for the stop control on the Oakland Drive approach to Rt. 60 and for the median yield bar control. The original study did not include median yield bar control.*
- 5. Traffic signal timing at Rt. 60/Croaker Road uses the coordinated split values. The original traffic study used the default values. This change more accurately reflects signal timing. A modified signal timing alternative also is included for the Rt. 60/Croaker Road intersection.*
- 6. The original traffic study used Trip Generation Manual 9th Edition (TGM9). This study uses the more up to date Trip Generation Manual 10th Edition (TGM10).*

All traffic counts in this study are the same as the original study.

TABLE OF CONTENTS

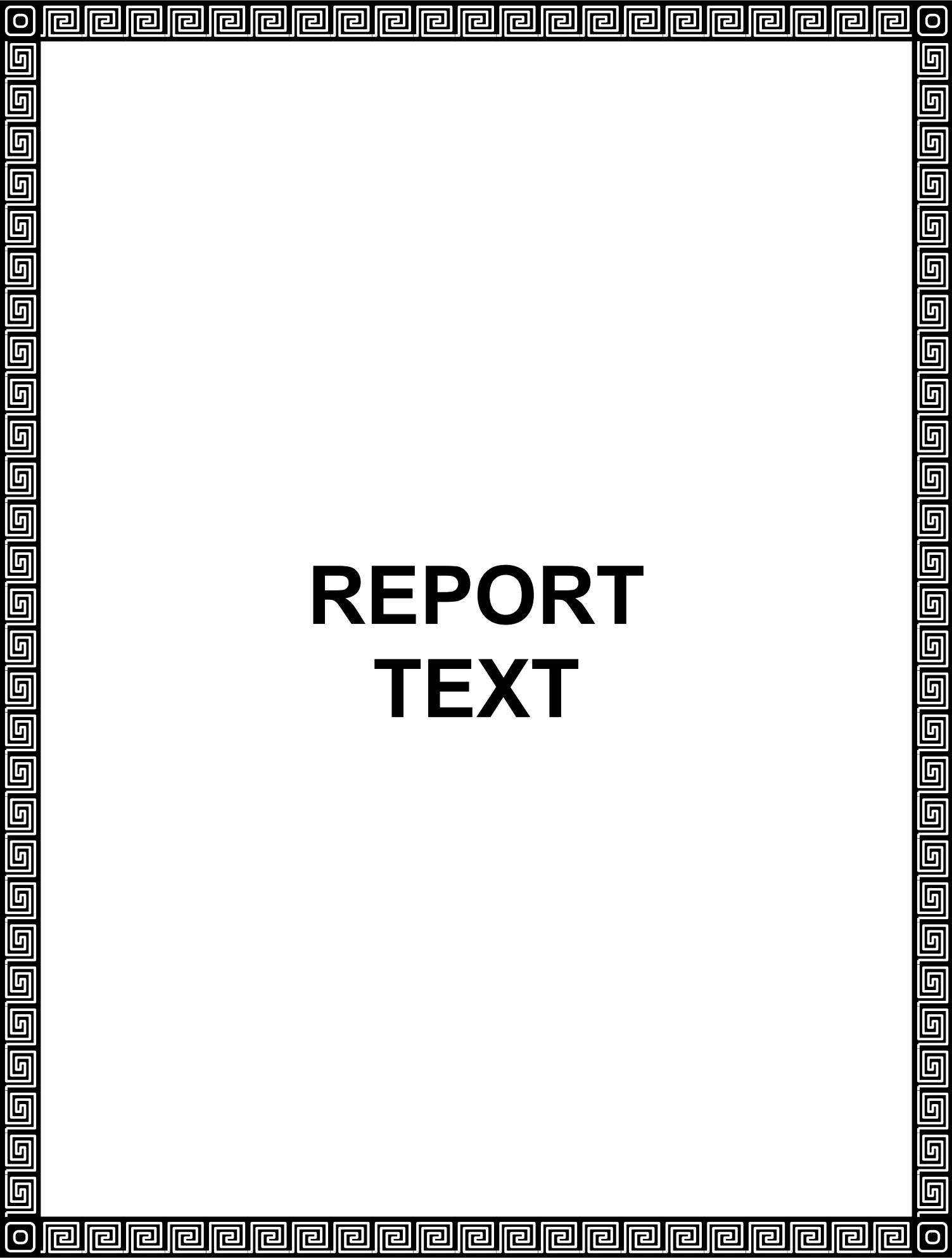
FOREWORD

REPORT TEXT	Page
-------------	------

Introduction And Scope	1
Existing Traffic Conditions.....	2
2025 Background Traffic	4
Site Trip Generation, Distribution And Assignment.....	6
2025 Traffic With Site	6
2025 Traffic With Site And Optimized Signal Timing.....	8
Summary & Conclusions	9

REPORT EXHIBITS	Number
-----------------	--------

Region And Area Maps	1
Oakland Pointe Apartments Conceptual Plan	2a
Oakland Pointe Apartments Road Improvements Plan.....	2b
Rt. 60/Oakland Drive Crossover Proposed Pavement And Traffic Control	2c
2017 Peak Hour Traffic Counts	3
Rt. 60 Richmond Road Traffic Counts and Trends.....	4
2025 Peak Hour Background Traffic – Growth Factor Only.....	5
Remaining Candle Factory & Oakland Pointe Site Trip Generation And Distribution	6
Remaining Candle Factory Assignment	7
2025 Background Traffic Traffic	8
Site Trip Assignment	9
2025 Traffic With Site	10



REPORT TEXT

INTRODUCTION AND SCOPE

Connelly Development, LLC proposes to develop an apartment project in James City County, Oakland Pointe Apartments. The site fronts on Rt. 60 Richmond Road between Croaker Road to the east and Oakland Drive to the west. The upper section of Exhibit 1 shows the site location in the VDOT Hampton Roads District. The lower section of Exhibit 1 shows the location of the site and adjacent areas on the County's parcel map.

Access to Oakland Pointe Apartments is proposed via an entrance on Oakland Drive through an adjacent property. This traffic study has been prepared to document existing and future traffic conditions with and without site development. The following intersections are included in the study for counts and analysis:

1. Rt. 60 Richmond Road/Croaker Road/Pricket Road - signalized
2. Rt. 60 Richmond Road/Oakland Drive - unsignalized

The conceptual development plan by AES is shown on Exhibit 2a and includes 126 apartments. Vehicular access is provided by a connection across the adjacent property to Oakland Drive. A sidewalk is included along the Rt. 60 frontage. Pedestrian access is provided throughout the development with pedestrian connections to Rt. 60 and Oakland Drive.

Road improvements proposed to be built by the project are shown on Exhibit 2b. These include:

1. Reconstruction of eastbound left turn lane on Rt. 60 at Croaker Road to extend existing 200 feet storage to 400 feet storage.
2. Reconstruction of Rt. 60/Oakland Drive intersection (see Exhibit 2c for detail) to include:
 - a. Pavement widening between median noses
 - b. Westbound left turn lane
 - c. Yield bars and centerline striping.

This study includes AM and PM peak hour traffic analysis at the existing two intersections for the following scenarios:

- Existing traffic
- 2025 without the project (with build out of Candle Factory rezoning/Village At Candle Station with access on Pricket Road)
- 2025 with the project and related improvements as shown on Exhibits 2b and 2c.

EXISTING TRAFFIC CONDITIONS

Intersection turning movement traffic counts were conducted by Peggy Malone & Associates from 7 to 9 AM and from 4 to 6 PM on Tuesday, October 10, 2017. Total volumes are tabulated on Appendix Exhibit A and B series and peak hour counts without balance are shown on Appendix Exhibit D.

Exhibit 3 shows AM and PM peak hour traffic on the study area road network diagram. Rt. 60 Richmond Road (posted speed limit 45 mph, east-west orientation) is a four lane divided roadway. Lane configurations at the Richmond Road intersections with Croaker Road/Pricket Road and Oakland Drive are shown on Exhibit 3.

Synchro 10 has been used to calculate intersection levels of service. VDOT signal timing was obtained for the Richmond Road/Croaker Road/Pricket Road intersection.

The following reports are included in the technical appendix:

1. For signalized Richmond Road/Croaker Road/Pricket Road, 2000 Highway Capacity Manual (HCM2000) report is used. See Appendix Exhibits J1 and J2 for the HCM2000 report AM and PM peak hours, respectively. HCM2010 HCM 6th Edition produce NEMA custom phasing violations and are not used.
2. Unsignalized intersection (Richmond Road/Oakland Drive) LOS results are shown in Appendix Exhibits K1 and K2 for the AM and PM peak hours, respectively.
3. Synchro Queues results are shown in Appendix Exhibits L1 and L2 for the AM and PM peak hours, respectively.
4. SimTraffic Queuing & Blocking results are shown in Appendix Exhibits M1, and M2 series for the AM and PM peak hours, respectively.

The following table shows existing peak hour intersection levels of service and queuing results at Richmond Road/Croaker Road/Pricket Road:

2017 COUNTS - TABLE 1-1 Richmond Road/ Croaker Road/Pricket Road									
Traffic LOS And Seconds Delay					95th Percentile Queues By Lane Group				
	AM		PM		Storage Length	Synchro		SimTraffic Q&B	
						AM	PM	AM	PM
Overall	C	31.3	D	36.1					
EBL	D	52.1	D	52.5	200	286	150	254	126
EBT	B	18.4	C	27.7		208	220	126	141
EBR	B	15.0	C	23.4	10	0	0	27	46
WBL	D	42.8	D	45.1	200	23	85	55	44
WBT	C	26.4	C	33.3		127	323	120	222
WBR	C	24.4	C	26.3	200	40	66	70	109
NBL	D	38.0	D	49.9	165	29	157	14	157
NBL/T	D	39.0	D	42.4		49	132	67	208
NBR	D	37.1	D	38.8	150	0	0	20	34
SBL/T	D	52.7	D	53.5		189	422	186	986
SBR	C	29.9	C	30.6	200	36	59	65	1145

SimTraffic queue shown is maximum report value for multi-lane groups

There is overall LOS C at the Richmond Road/Croaker Road intersection in the AM peak hour and overall LOS D in the PM peak hour. There is LOS D or better for all turning movements.

Queuing on the eastbound left turn on Richmond Road at Croaker Road is of importance because site traffic will use this turn lane for left turns. Queuing for this left turn was recorded at the time of counts and is tabulated on Appendix Exhibits C1 and C2. The following table shows the recorded queues and calculated values in Table 1-1.

TABLE 1-2 EASTBOUND LEFT QUEUING		
SOURCE	AM	PM
Field	250	161
Synchro	286	150
SimTraffic	254	126

A 10-minute SimTraffic interval was used for AM peak hour traffic and a 60-minute interval was used for PM peak hour traffic as was done in the previous study to calibrate the eastbound left turn queue.

In Table 1-1, the other notable queues are on the southbound approach in the PM peak hour.

The following table shows existing peak hour intersection levels of service and queuing results at Rt. 60 Richmond Road/Oakland Drive:

2017 COUNTS - TABLE 1-3 Richmond Road/Oakland Drive									
Traffic LOS And Seconds Delay					95th Percentile Queues By Lane Group				
	AM		PM		Storage Length	HCM 6th		SimTraffic Q&B	
						AM	PM	AM	PM
NBL	C	19.4	C	21.4		3	3	21	21
NBT	B	11.7	B	11.2		3	3	22	26
WBL	A	9.8	A	9.5		0	3		40

The existing intersection is controlled by a stop sign on the Oakland Drive approach to eastbound Rt. 60. The northbound left turn on Oakland Drive has LOS C in the AM peak hour and PM peak hour. All other movements have LOS A and B.

2025 BACKGROUND TRAFFIC

Exhibit 4 shows VDOT daily traffic counts (2012 through 2016) and linear regression analysis trend for Rt. 60 Richmond Road west and east of Croaker Road. For the 2025 design year, the traffic counts show 1.0 growth factor west of Croaker Road and a 1.08 growth factor east of Croaker Road.

A 1.08 growth factor is applied to 2017 counts to produce 2025 background traffic (growth factor only) as shown on Exhibit 5.

Build out of the Candle Factory development on Pricket Road (including Village at Candle Station) is also included in this traffic study. Table 1 on Exhibit 6 shows trip generation for the remaining development on Pricket Road using Trip Generation 10th Edition (TGM10). Table 2 shows trip distribution for the remaining development (see Appendix Exhibit E for trip assignment percentages for Pricket Road and for Oakland Drive). Trip assignments for the remaining development are shown on Exhibit 7 and 2025 background traffic without Oakland Pointe Apartments is shown on Exhibit 8.

For analysis reports, see Technical Appendix as follows:

- HCM2000 signalized intersections LOS: Exhibit J3 and J4
- Unsignalized intersection: Exhibit K3 and K4
- Synchro Queues: Exhibits L3 and L4.
- SimTraffic Queuing & Blocking: Exhibits M3 and M4.

The following table shows 2025 background traffic peak hour intersection levels of service and queuing results at Rt. 60 Richmond Road/Croaker Road/Pricket Road:

2025 Background - TABLE 2-1 Richmond Road/ Croaker Road/Pricket Road									
Traffic LOS And Seconds Delay By Lane					95th Percentile Queues By Lane Group				
	AM		PM		Storage Length	Synchro		SimTraffic Q&B	
Overall	C	31.4	D	39.6		AM	PM	AM	PM
EBL	D	51.3	E	59.7	200	321	162	273	136
EBT	B	19.6	C	29.4		227	241	213	175
EBR	B	15.9	C	24.4	10	0	0	57	62
WBL	D	40.4	D	48.6	200	28	90	60	122
WBT	C	27.0	D	36.5		136	353	104	216
WBR	C	24.9	C	27.8	200	47	79	81	131
NBL	D	38.2	E	57.0	165	54	168	14	172
NBL/T	D	38.9	D	45.7		70	138	93	225
NBR	D	36.5	D	40.9	150	0	0	33	90
SBL/T	D	50.1	E	57.1		214	470	434	950
SBR	C	29.4	D	41.5	200	45	67	248	1146

SimTraffic queue shown is maximum report value for multi-lane groups

Overall intersection LOS for both peak hours is the same as existing conditions with not much change for turning movement LOS in the AM peak hour. For the eastbound left, northbound

left and the southbound left/through in the PM peak hour, LOS changed from LOS D to LOS E.

The following table shows existing peak hour intersection levels of service and queuing results at Rt. 60 Richmond Road/Oakland Drive:

2025 Background - TABLE 2-2 Richmond Road/Oakland Drive									
Traffic LOS And Seconds Delay By Lane					95th Percentile Queues By Lane Group				
	AM		PM		Storage Length	HCM 6th		SimTraffic Q&B	
						AM	PM	AM	PM
NBL	C	19.4	C	22.7	180	3	3	44	32
NBT	B	11.6	B	11.2	180	3	3	25	31
WBL	A	9.8	A	9.6		0	3	14	59

The northbound left turn on Oakland Drive has LOS C in the AM peak hour AND PM peak hours. All other movements have LOS A and B.

SITE TRIP GENERATION, DISTRIBUTION AND ASSIGNMENT

Table 3 on Exhibit 6 shows trip generation for the site using TGM10, published by the Institute of Transportation Engineers (ITE). Site trip distribution is shown in Table 4 on Exhibit 6.

Site trip assignment is shown on Exhibit 9.

2025 TRAFFIC WITH SITE

Exhibit 10 shows 2025 AM and PM peak hour traffic with site traffic.

The westbound left turn on Richmond Road at Oakland Drive warrants a left turn lane (see Appendix Exhibit F) of 100-foot full width lane with 100-foot taper. This improvement is included on Exhibit 10. Also included for analysis is an additional 200 feet of storage on the eastbound left turn on Richmond Road at Croaker Road.

A major change with previous studies is the reconstruction of the Rt. 60/Oakland Drive crossover add area to the crossover and to included yield bars and a centerline stripe as shown on Exhibit 2c. This allows two step traffic operations for left turns at this location.

For analysis reports, see Technical Appendix as follows:

- HCM2000 signalized intersections LOS: Exhibit J5 and J6 series
- Unsignalized intersection LOS: Exhibits K5 and K6 series
- Synchro Queues: Exhibits L5 and L6 series
- SimTraffic Queuing & Blocking: Exhibits M5 and M6 series.

The following table shows 2025 total traffic peak hour intersection levels of service and queuing results at Rt. 60 Richmond Road/Croaker Road/Pricket Road:

2025 Total - TABLE 3-1 Richmond Road/ Croaker Road/Pricket Road Existing Signal Timing - Oakland Drive Access									
Traffic LOS And Seconds Delay					95th Percentile Queues By Lane Group				
	AM		PM		Storage Length	Synchro		SimTraffic Q&B	
Overall	C		D			AM	PM	AM	PM
EBL	E	57.2	E	63.8	400	341	193	409	170
EBT	B	19.8	C	30.7		234	262	132	165
EBR	B	15.9	C	25.4	10	0	0	47	64
WBL	D	40.5	D	50.5	200	28	102	63	138
WBT	C	27.0	D	39.0		138	377	153	226
WBR	C	24.9	C	28.8	200	46	98	75	123
NBL	D	38.3	E	62.5	165	54	208	51	171
NBL/T	D	39.0	D	47.3		71	151	119	235
NBR	D	36.6	D	41.1	150	0	0	29	109
SBL/T	D	49.9	E	59.0		215	422	290	948
SBR	C	29.4	C	31.3	200	48	60	206	499

SimTraffic queue shown is maximum report value for multi-lane groups

Overall intersection LOS for both peak hours is the same as existing conditions. The AM peak hour eastbound left turn has LOS E the AM and the eastbound left, northbound left and the southbound left/through have LOS E in the PM peak hour like the background traffic.

With the proposed yield bar/centerline stripe at the Rt. 60/Oakland Drive crossover, LOS is calculated separately for eastbound and westbound Rt. 60 as follows:

2025 Total - TABLE 3-2 EB Richmond Road/Oakland Drive - Oakland Drive Access									
Traffic LOS And Seconds Delay					95th Percentile Queues By Lane Group				
	AM		PM		Storage Length	HCM 6th		SimTraffic Q&B	
						AM	PM	AM	PM
NBT	C	17.3	C	16.6	180	5	5	32	50
NBR	B	12.0	B	11.5	180	8	5	24	32
SBL/T	C	19.1	C	19.6		5	18	34	51

2025 Total - TABLE 3-3 WB Richmond Road/Oakland Drive - Oakland Drive Access									
Traffic LOS And Seconds Delay					95th Percentile Queues By Lane Group				
	AM		PM		Storage Length	HCM 6th		SimTraffic Q&B	
						AM	PM	AM	PM
WBL					100				33
NBL	B	10.9	C	16.3	50	3	5	41	57

All movements at the two locations have LOS C.

2025 TRAFFIC WITH SITE AND OPTIMIZED SIGNAL TIMING

As a sensitivity test for LOS and queuing results, the signal timing at the intersection has been optimized using Synchro with the following results:

2025 Total - TABLE 4-1 Richmond Road/ Croaker Road/Pricket Road Optimized Signal Timing - Oakland Drive Access									
Traffic LOS And Seconds Delay					95th Percentile Queues By Lane Group				
	AM		PM		Storage Length	Synchro		SimTraffic Q&B	
						AM	PM	AM	PM
Overall	C	31.7	D	41.1					
EBL	D	50.8	E	68.5	400	269	205	413	156
EBT	B	19.4	C	30.6		239	260	349	165
EBR	B	15.6	C	25.3	10	0	0	42	73
WBL	D	42.2	D	50.5	200	32	102	69	119
WBT	C	27.6	D	38.1		166	370	131	227
WBR	C	25.5	C	28.5	200	10	91	78	133
NBL	D	40.0	E	64.7	165	63	214	10	185
NBL/T	D	41.1	D	48.1		81	152	116	255
NBR	D	38.1	D	41.4	150	0	0	29	121
SBL/T	D	50.4	E	59.2		247	422	212	969
SBR	C	30.4	C	31.5	200	11	60	47	499

SimTraffic queue shown is maximum report value for multi-lane groups

In the AM peak hour, the eastbound left turn LOS reduces to D.

The following tables show peak hour intersection levels of service and queuing results at Rt. 60 Richmond Road/Oakland Drive:

2025 Total - TABLE 4-2 EB Richmond Road/Oakland Drive - Oakland Drive Access									
Traffic LOS And Seconds Delay					95th Percentile Queues By Lane Group				
	AM		PM		Storage Length	HCM 6th		SimTraffic Q&B	
						AM	PM	AM	PM
NBT	C	17.3	C	16.6	180	5	5	31	42
NBR	B	12.0	B	11.5	180	8	5	33	34
SBL/T	C	19.1	C	19.6	50	5	18	32	46

2025 Total - TABLE 4-3 WB Richmond Road/Oakland Drive - Oakland Drive Access									
Traffic LOS And Seconds Delay					95th Percentile Queues By Lane Group				
	AM		PM		Storage Length	HCM 6th		SimTraffic Q&B	
						AM	PM	AM	PM
WBL					100				28
NBL	B	10.9	C	16.3	50	3	5	34	50

LOS is the same at Rt. 60/Oakland Drive crossover with optimized timing and queues are somewhat reduced.

SUMMARY AND CONCLUSIONS

Traffic levels of service are not much affected by the project with the greatest effect being the increase in the queue on the eastbound left turn lane on Rt. 60 at Croaker Road.

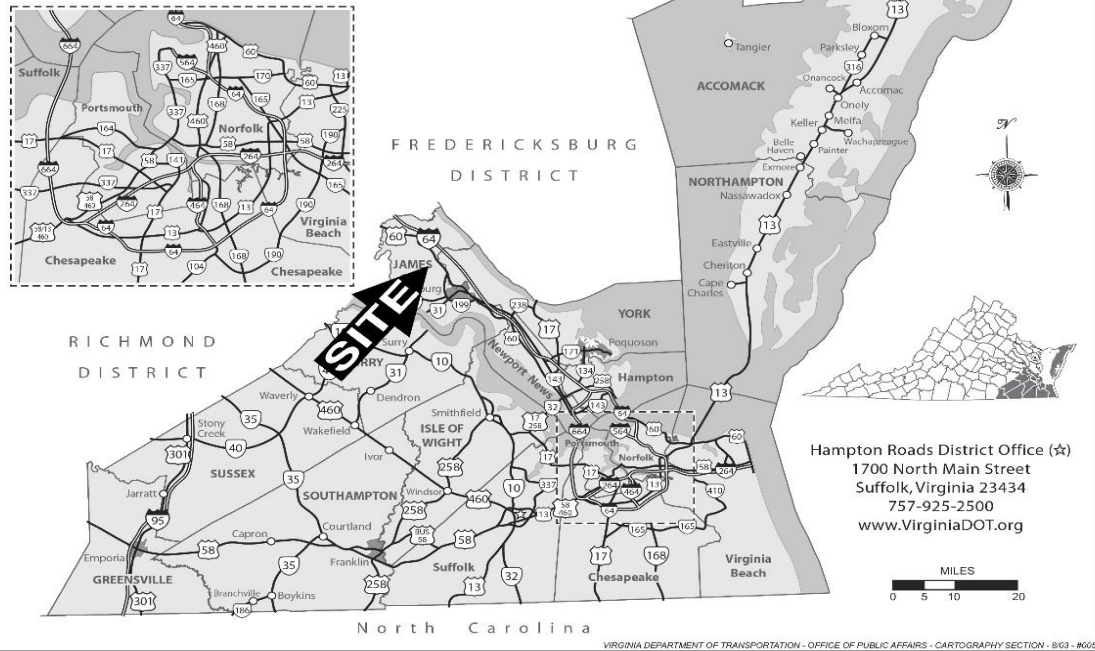
Improvements to the Rt. 60 corridor by the development to compensate for impacts as shown on Exhibit 2b and 2c include:

1. Reconstruction of eastbound left turn lane on Rt. 60 at Croaker Road to extend existing 200 feet storage to 400 feet storage.
2. Reconstruction of Rt. 60/Oakland Drive intersection (see Exhibit 2c) to include:
 - a. Pavement widening between median noses
 - b. Westbound left turn lane
 - c. Yield bars and centerline striping.



REPORT EXHIBITS

Virginia Department of Transportation HAMPTON ROADS DISTRICT



OAKLAND POINTE APARTMENTS
REGION AND AREA MAPS

DRW Consultants, LLC
804-794-7312

Exhibit 1



Rev	Date	Description
1	10/27/17	REVISIONS TO COMMENTS
2	10/27/17	REVISIONS TO COMMENTS
3	10/27/17	REVISIONS TO COMMENTS
4	10/27/17	REVISIONS TO COMMENTS
5	10/27/17	REVISIONS TO COMMENTS
6	10/27/17	REVISIONS TO COMMENTS
7	10/27/17	REVISIONS TO COMMENTS
8	10/27/17	REVISIONS TO COMMENTS
9	10/27/17	REVISIONS TO COMMENTS
10	10/27/17	REVISIONS TO COMMENTS
11	10/27/17	REVISIONS TO COMMENTS
12	10/27/17	REVISIONS TO COMMENTS
13	10/27/17	REVISIONS TO COMMENTS
14	10/27/17	REVISIONS TO COMMENTS
15	10/27/17	REVISIONS TO COMMENTS
16	10/27/17	REVISIONS TO COMMENTS
17	10/27/17	REVISIONS TO COMMENTS
18	10/27/17	REVISIONS TO COMMENTS
19	10/27/17	REVISIONS TO COMMENTS
20	10/27/17	REVISIONS TO COMMENTS
21	10/27/17	REVISIONS TO COMMENTS
22	10/27/17	REVISIONS TO COMMENTS
23	10/27/17	REVISIONS TO COMMENTS
24	10/27/17	REVISIONS TO COMMENTS
25	10/27/17	REVISIONS TO COMMENTS
26	10/27/17	REVISIONS TO COMMENTS
27	10/27/17	REVISIONS TO COMMENTS
28	10/27/17	REVISIONS TO COMMENTS
29	10/27/17	REVISIONS TO COMMENTS
30	10/27/17	REVISIONS TO COMMENTS
31	10/27/17	REVISIONS TO COMMENTS
32	10/27/17	REVISIONS TO COMMENTS
33	10/27/17	REVISIONS TO COMMENTS
34	10/27/17	REVISIONS TO COMMENTS
35	10/27/17	REVISIONS TO COMMENTS
36	10/27/17	REVISIONS TO COMMENTS
37	10/27/17	REVISIONS TO COMMENTS
38	10/27/17	REVISIONS TO COMMENTS
39	10/27/17	REVISIONS TO COMMENTS
40	10/27/17	REVISIONS TO COMMENTS
41	10/27/17	REVISIONS TO COMMENTS
42	10/27/17	REVISIONS TO COMMENTS
43	10/27/17	REVISIONS TO COMMENTS
44	10/27/17	REVISIONS TO COMMENTS
45	10/27/17	REVISIONS TO COMMENTS
46	10/27/17	REVISIONS TO COMMENTS
47	10/27/17	REVISIONS TO COMMENTS
48	10/27/17	REVISIONS TO COMMENTS
49	10/27/17	REVISIONS TO COMMENTS
50	10/27/17	REVISIONS TO COMMENTS
51	10/27/17	REVISIONS TO COMMENTS
52	10/27/17	REVISIONS TO COMMENTS
53	10/27/17	REVISIONS TO COMMENTS
54	10/27/17	REVISIONS TO COMMENTS
55	10/27/17	REVISIONS TO COMMENTS
56	10/27/17	REVISIONS TO COMMENTS
57	10/27/17	REVISIONS TO COMMENTS
58	10/27/17	REVISIONS TO COMMENTS
59	10/27/17	REVISIONS TO COMMENTS
60	10/27/17	REVISIONS TO COMMENTS
61	10/27/17	REVISIONS TO COMMENTS
62	10/27/17	REVISIONS TO COMMENTS
63	10/27/17	REVISIONS TO COMMENTS
64	10/27/17	REVISIONS TO COMMENTS
65	10/27/17	REVISIONS TO COMMENTS
66	10/27/17	REVISIONS TO COMMENTS
67	10/27/17	REVISIONS TO COMMENTS
68	10/27/17	REVISIONS TO COMMENTS
69	10/27/17	REVISIONS TO COMMENTS
70	10/27/17	REVISIONS TO COMMENTS
71	10/27/17	REVISIONS TO COMMENTS
72	10/27/17	REVISIONS TO COMMENTS
73	10/27/17	REVISIONS TO COMMENTS
74	10/27/17	REVISIONS TO COMMENTS
75	10/27/17	REVISIONS TO COMMENTS
76	10/27/17	REVISIONS TO COMMENTS
77	10/27/17	REVISIONS TO COMMENTS
78	10/27/17	REVISIONS TO COMMENTS
79	10/27/17	REVISIONS TO COMMENTS
80	10/27/17	REVISIONS TO COMMENTS
81	10/27/17	REVISIONS TO COMMENTS
82	10/27/17	REVISIONS TO COMMENTS
83	10/27/17	REVISIONS TO COMMENTS
84	10/27/17	REVISIONS TO COMMENTS
85	10/27/17	REVISIONS TO COMMENTS
86	10/27/17	REVISIONS TO COMMENTS
87	10/27/17	REVISIONS TO COMMENTS
88	10/27/17	REVISIONS TO COMMENTS
89	10/27/17	REVISIONS TO COMMENTS
90	10/27/17	REVISIONS TO COMMENTS
91	10/27/17	REVISIONS TO COMMENTS
92	10/27/17	REVISIONS TO COMMENTS
93	10/27/17	REVISIONS TO COMMENTS
94	10/27/17	REVISIONS TO COMMENTS
95	10/27/17	REVISIONS TO COMMENTS
96	10/27/17	REVISIONS TO COMMENTS
97	10/27/17	REVISIONS TO COMMENTS
98	10/27/17	REVISIONS TO COMMENTS
99	10/27/17	REVISIONS TO COMMENTS
100	10/27/17	REVISIONS TO COMMENTS

THIS PLAN HAS
NOT RECEIVED
FINAL APPROVAL
AND IS NOT
APPROVED FOR
CONSTRUCTION.

AES
CONSULTING ENGINEERS
1000 Old Town Road, Suite 1
Farmingdale, NY 11735
Tel: (516) 255-0000
Fax: (516) 255-0000
www.aes-engineers.com

MASTER PLAN
for
OAKLAND POINTE
DEVELOPER: CONNELLY BUILDERS, INC.
JAMES CITY COUNTY
DISTRICT: STONEHURST

Project Number	1000-00
Project Name	1000-00
Scale	1" = 50'
Sheet No.	1 of 1
Sheet Title	RENDERED PROPOSED ROAD IMPROVEMENTS PLAN



OAKLAND POINTE APARTMENTS ROAD IMPROVEMENTS PLAN

DRW Consultants, LLC
804-794-7312

Exhibit 2b

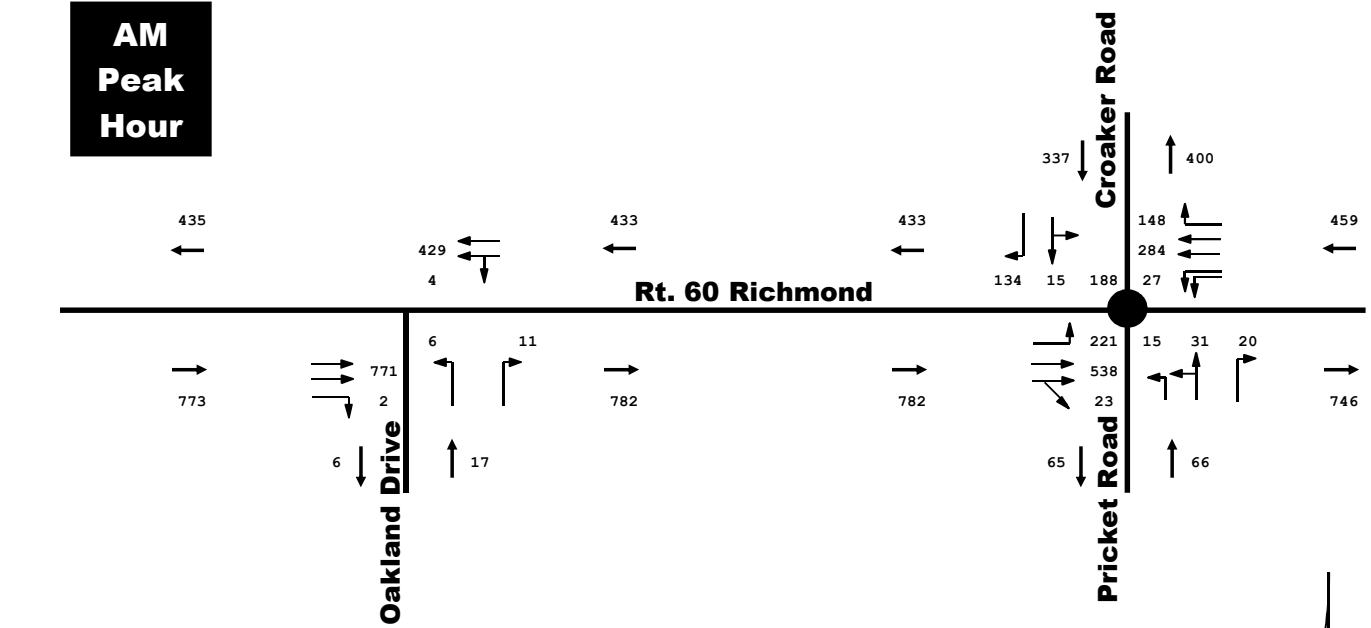


RT. 60/OAKLAND DRIVE CROSSOVER
PROPOSED PAVEMENT AND TRAFFIC CONTROL

DRW Consultants, LLC
804-794-7312

Exhibit 2c

**AM
Peak
Hour**



**PM
Peak
Hour**

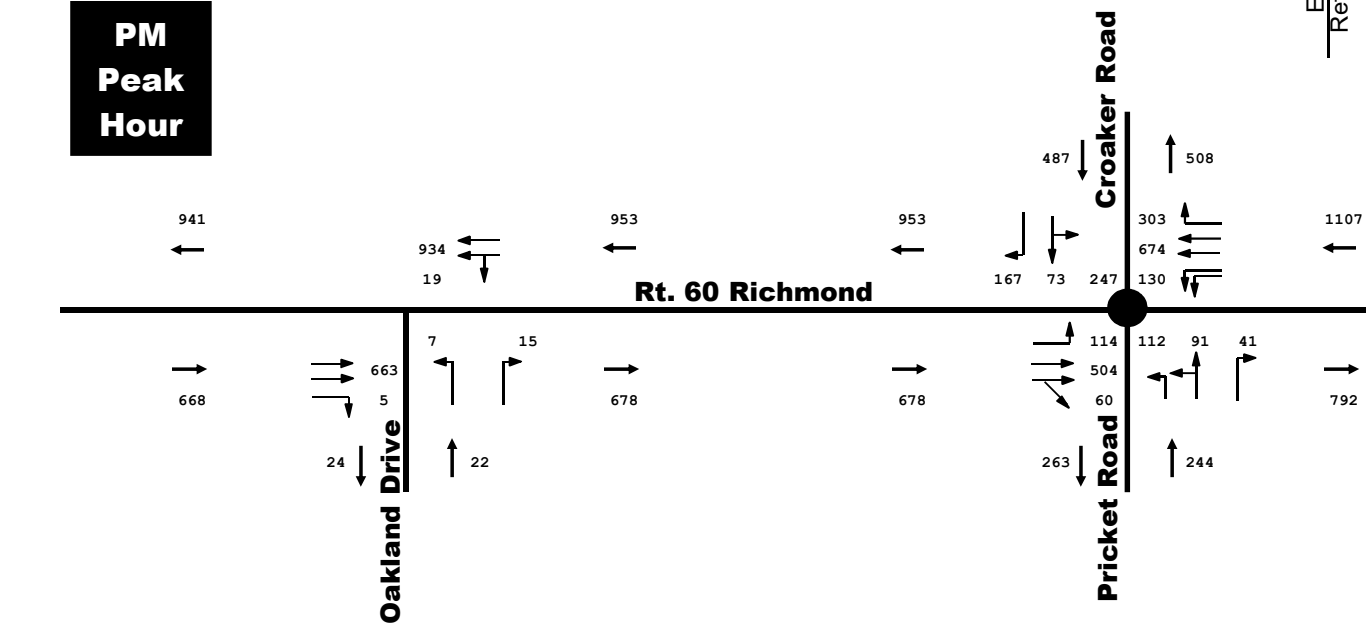


Exhibit
Reference

2017 PEAK HOUR COUNTS
WITH BALANCE

DRW Consultants, LLC
804-794-7312

Exhibit 3

Street: Richmond Road, Rt. 60

From: Rt. 30

To: Croaker Road

Street: Richmond Road, Rt. 60

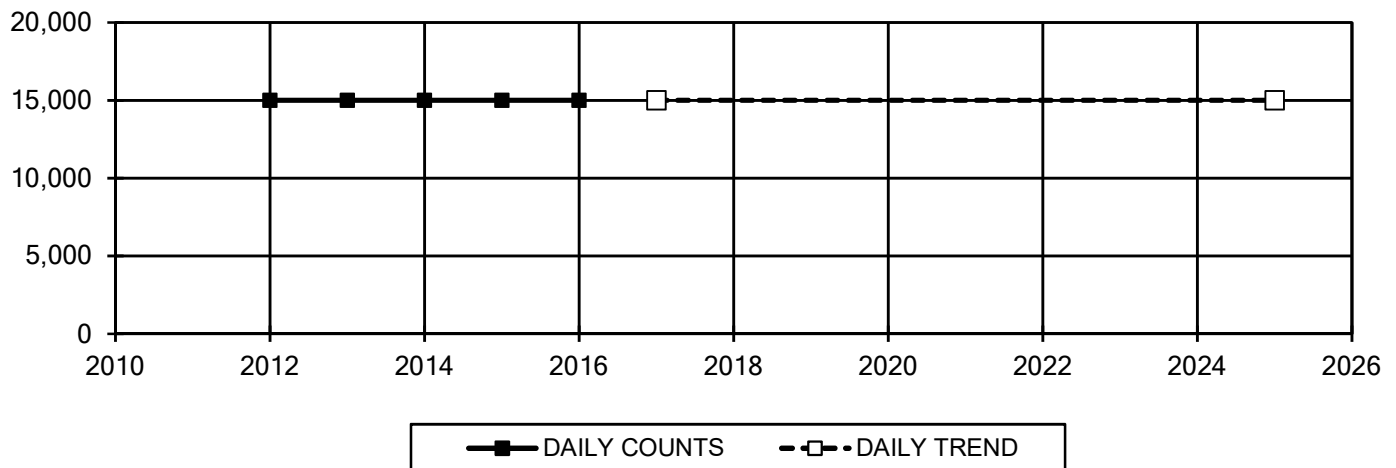
From: Croaker Road

To: Centerville Road

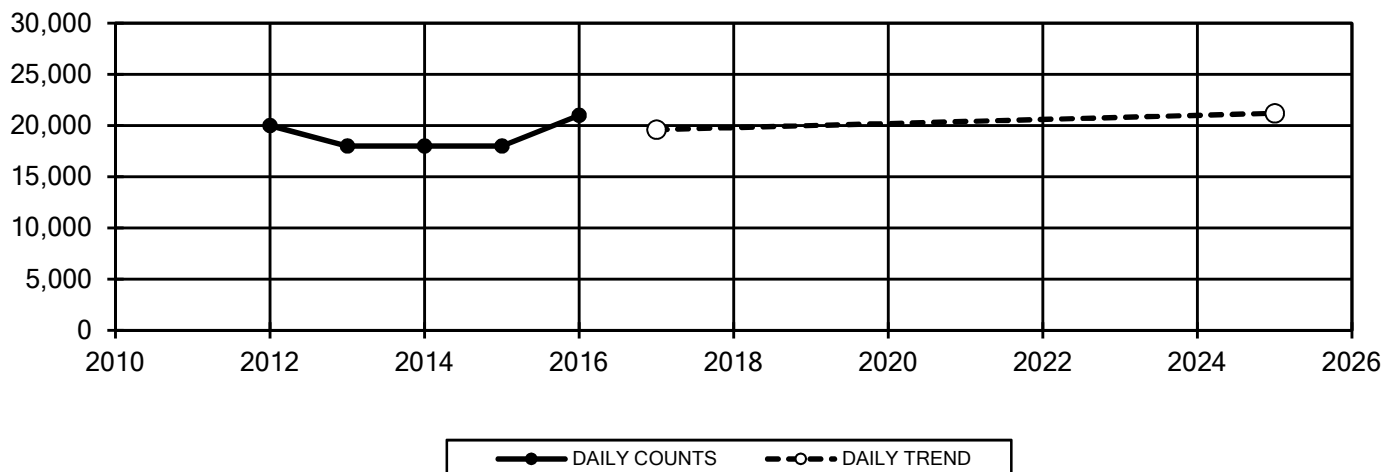
Year	DAILY COUNTS	
2012	15,000	
2013	15,000	
2014	15,000	
2015	15,000	
2016	15,000	
Year	DAILY TREND	
2017	15,000	$\Delta 17$
2025	15,000	1.00

Year	DAILY COUNTS	
2012	20,000	
2013	18,000	
2014	18,000	
2015	18,000	
2016	21,000	
Year	DAILY TREND	
2017	19,600	$\Delta 17$
2025	21,200	1.08

From Rt. 30 To Croaker Road



From Croaker Road To Centerville Road



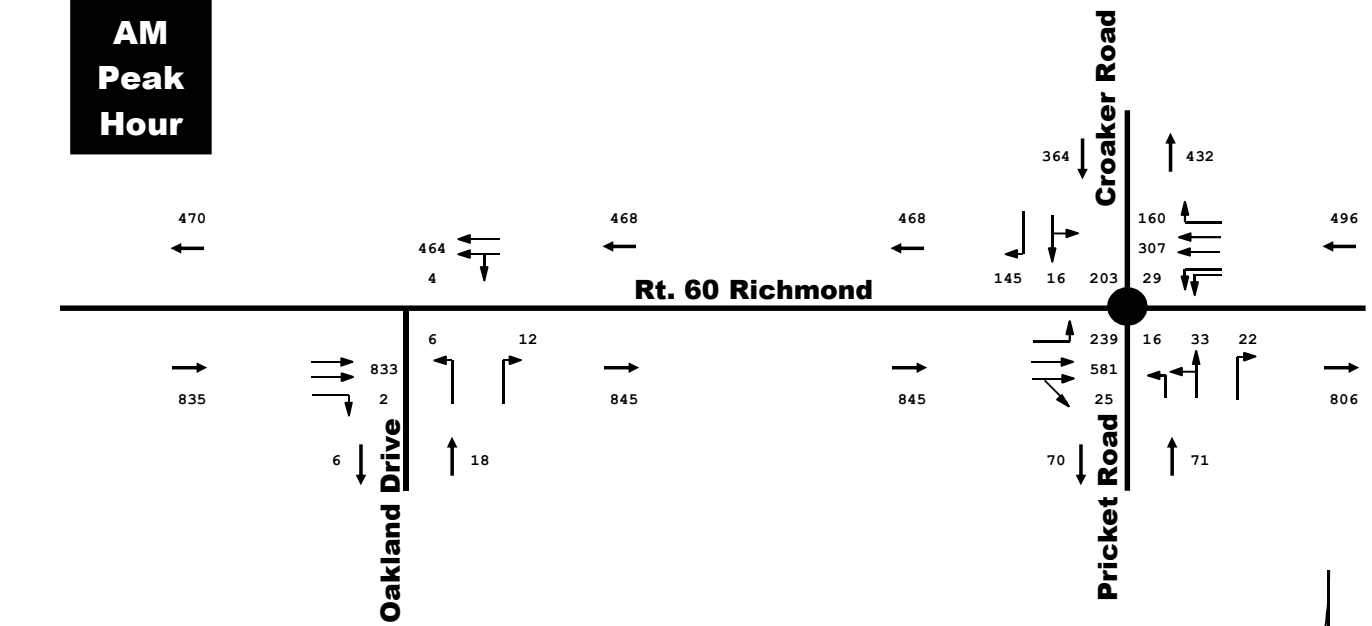
VDOT Average Annual Daily Traffic (AADT) Volume Estimates

RT. 60 RICHMOND ROAD
DAILY TRAFFIC COUNTS AND TRENDS

DRW Consultants, LLC
804-794-7312

Exhibit 4

**AM
Peak
Hour**



**PM
Peak
Hour**

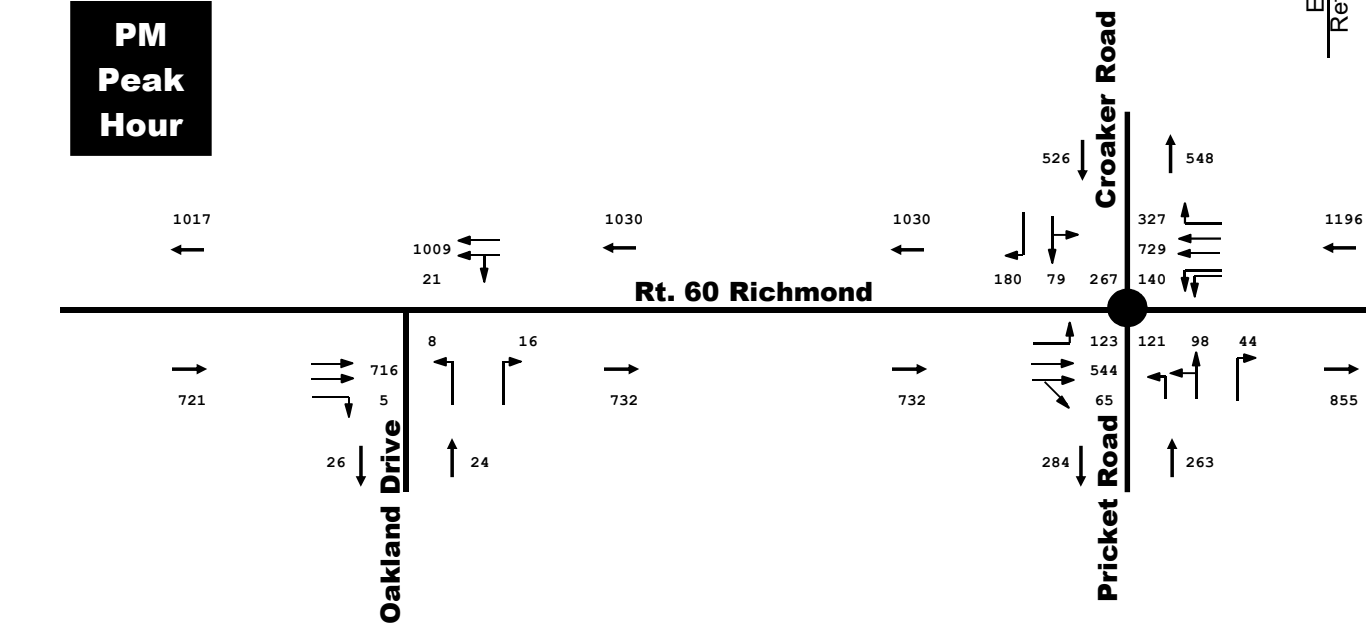


Exhibit
Reference

2025 PEAK HOUR BACKGROUND TRAFFIC
GROWTH FACTOR ONLY

DRW Consultants, LLC
804-794-7312

Exhibit 5

VALUE LAND USE		LAND USE CODE	SQ.FT., OTHER UNITS	WEEKDAY TRIP GENERATION						
				AM PEAK HOUR			PM PEAK HOUR			DAILY
				Enter	Exit	Total	Enter	Exit	Total	

TABLE 1 - Trip Generation - Candle Factory Remaining Development

eq.-adj. st.	Single-Family	210	33 units	7	21	28	22	13	35	375
eq.-adj. st.	Multifamily Low Rise	220	78 units	9	29	38	30	17	47	549
rate-adj. st.	Mini-Warehouse	151	355 units	2	1	3	3	4	7	63
TOTAL:				18	51	69	55	34	89	987

TABLE 2 - Candle Factory Trip Distribution

		18				51	69	55		34	89	
		AM Peak Hour					PM Peak Hour					
		Entering Traffic		Exiting Traffic			Entering Traffic		Exiting Traffic			
		Direction	% Dist.	Trips	% Dist.		Trips	% Dist.	Trips	% Dist.	Trips	
	Rt. 60 West	33%	6	33%	17			33%	18	33%	11	
	Rt. 60 East	40%	7	40%	20			40%	22	40%	14	
	Croaker North	27%	5	27%	14			27%	15	27%	9	
		100%	18	100%	51			100%	55	100%	34	

TABLE 3 - Trip Generation - Oakland Farm Apartments

eq.-adj. st.	Multifamily Low Rise	220	126 units	14	45	59	46	27	73	912
TOTAL:				14	45	59	46	27	73	912

TABLE 4 - Oakland Farm Trip Distribution

		14				45	59	46	27	73
		AM Peak Hour				PM Peak Hour				
		Entering Traffic		Exiting Traffic		Entering Traffic		Exiting Traffic		
Direction	% Dist.	Trips	% Dist.	Trips		% Dist.	Trips	% Dist.	Trips	
Rt. 60 West	33%	5	33%	15		33%	15	33%	9	
Rt. 60 East	40%	5	40%	18		40%	19	40%	11	
Croaker North	27%	4	27%	12		27%	12	27%	7	
	100%	14	100%	45		100%	46	100%	27	

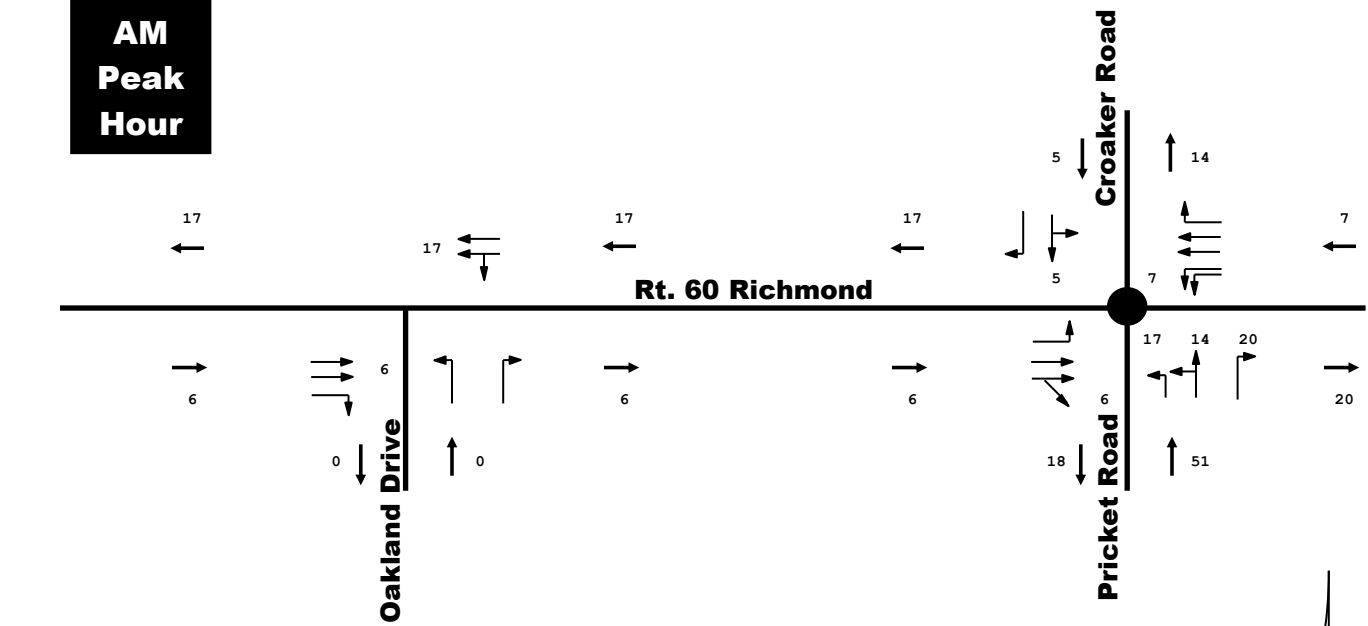
Trip generation rates from Trip Generation Manual, 10th Edition
(TGM10) by the Institute of Transportation Engineers (ITE)

REMAINING CANDLE FACTORY DEVELOPMENT
AND OAKLAND FARM APARTMENTS
TRIP GENERATION AND DISTRIBUTION

DRW Consultants, LLC
804-794-7312

Exhibit 6

**AM
Peak
Hour**



TO

WILLIAMSBURG

**PM
Peak
Hour**

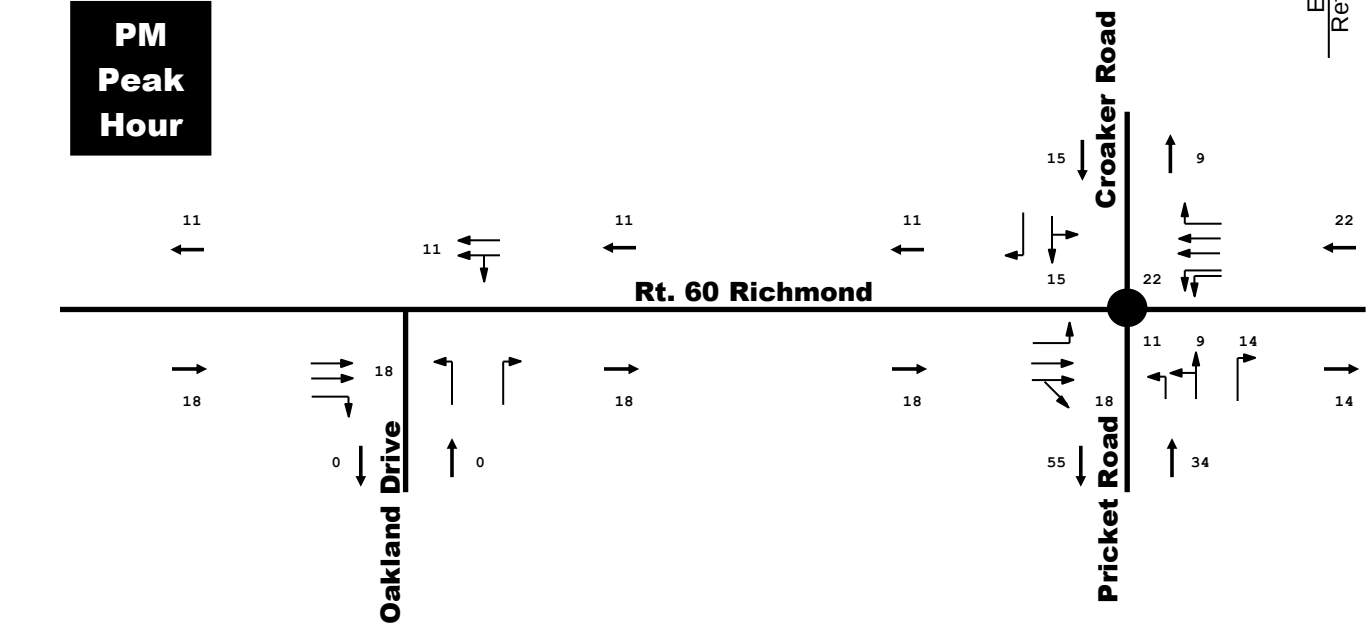


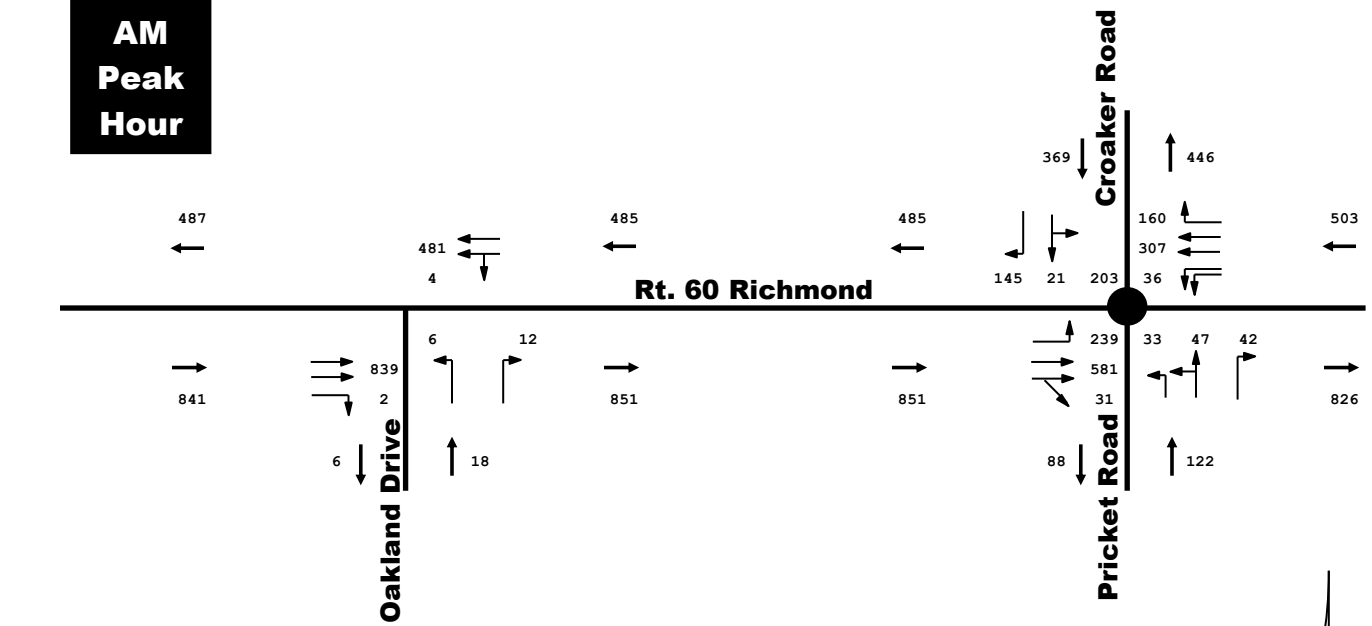
Exhibit
Reference

REMAINING CANDLE FACTORY TRIP ASSIGNMENT

DRW Consultants, LLC
804-794-7312

Exhibit 7

**AM
Peak
Hour**



**PM
Peak
Hour**

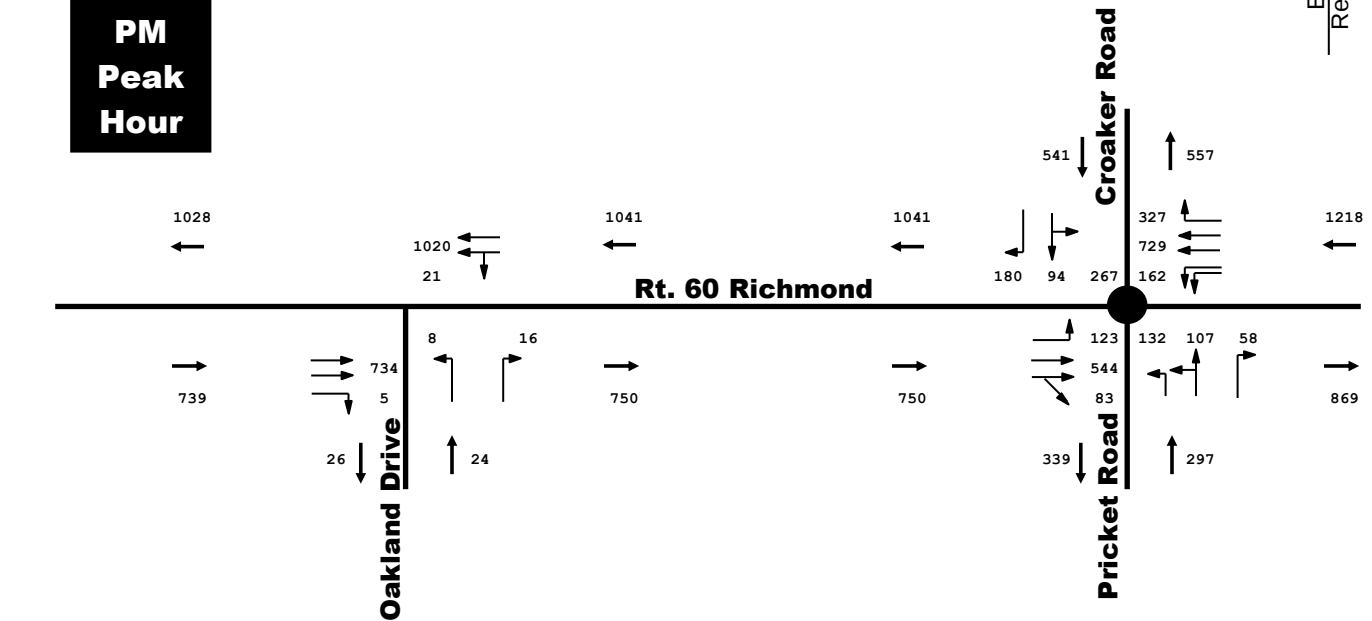


Exhibit
Reference

2025 PEAK HOUR BACKGROUND TRAFFIC
WITHOUT OAKLAND FARM APARTMENTS

DRW Consultants, LLC
804-794-7312

Exhibit 8

**AM
Peak
Hour**

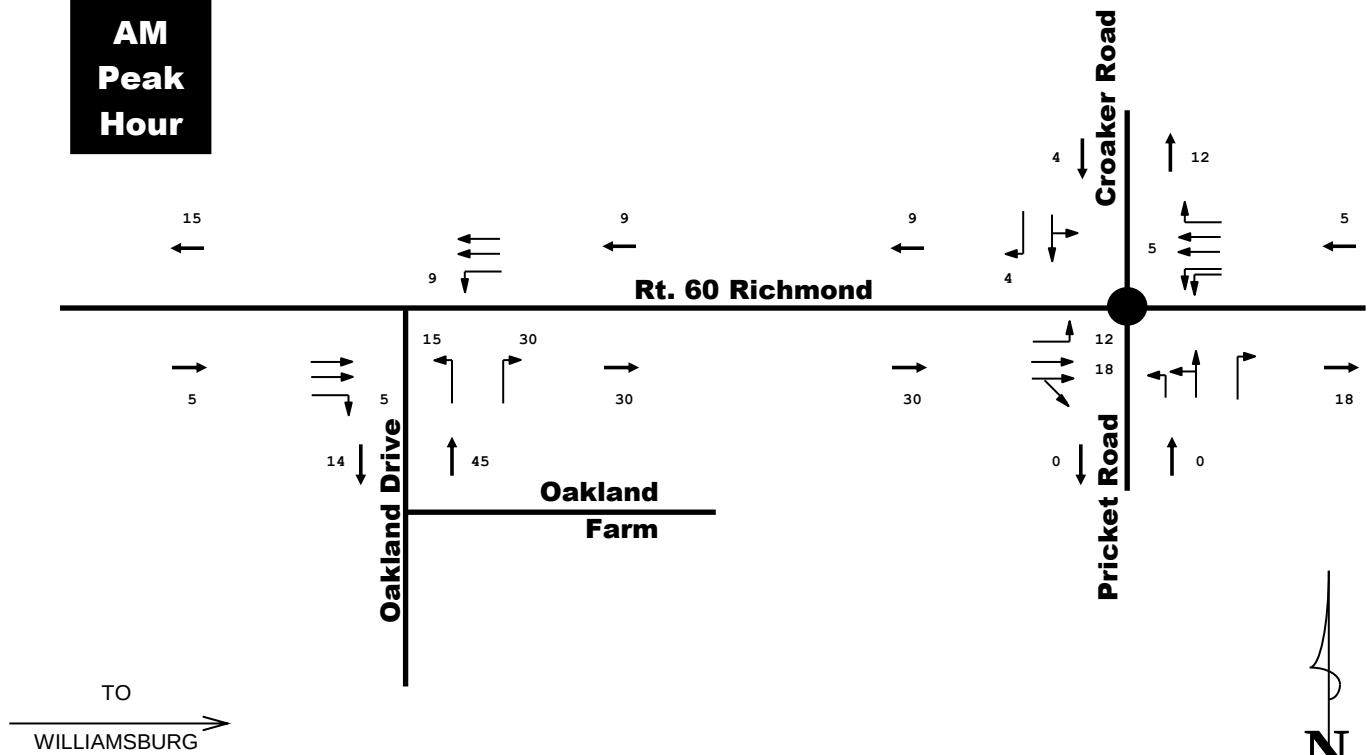
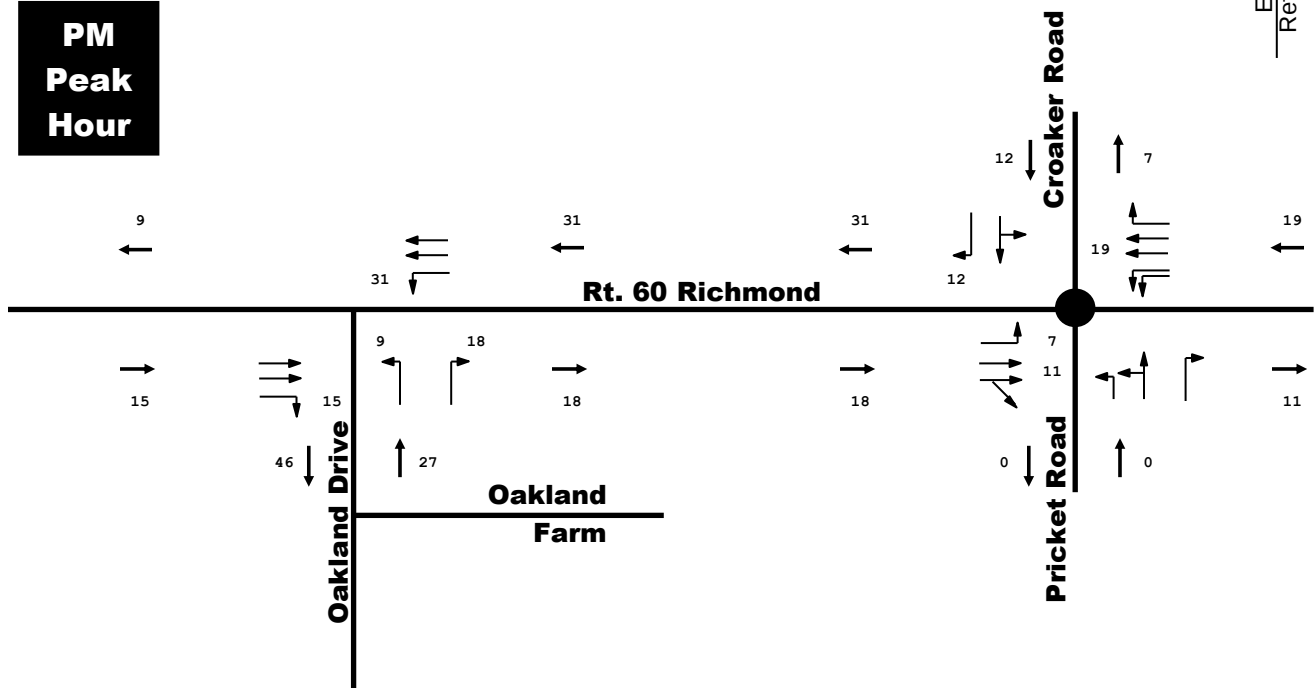
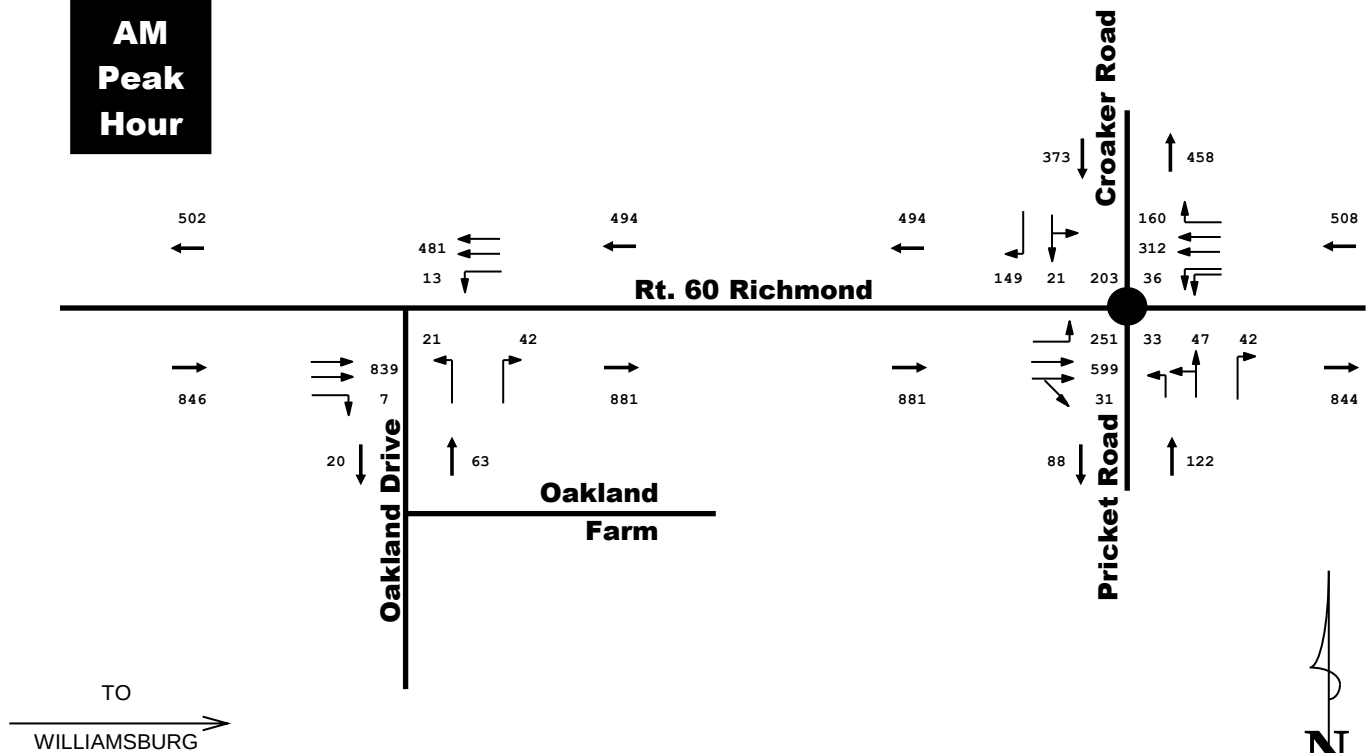


Exhibit
Reference

**PM
Peak
Hour**



**AM
Peak
Hour**



**PM
Peak
Hour**

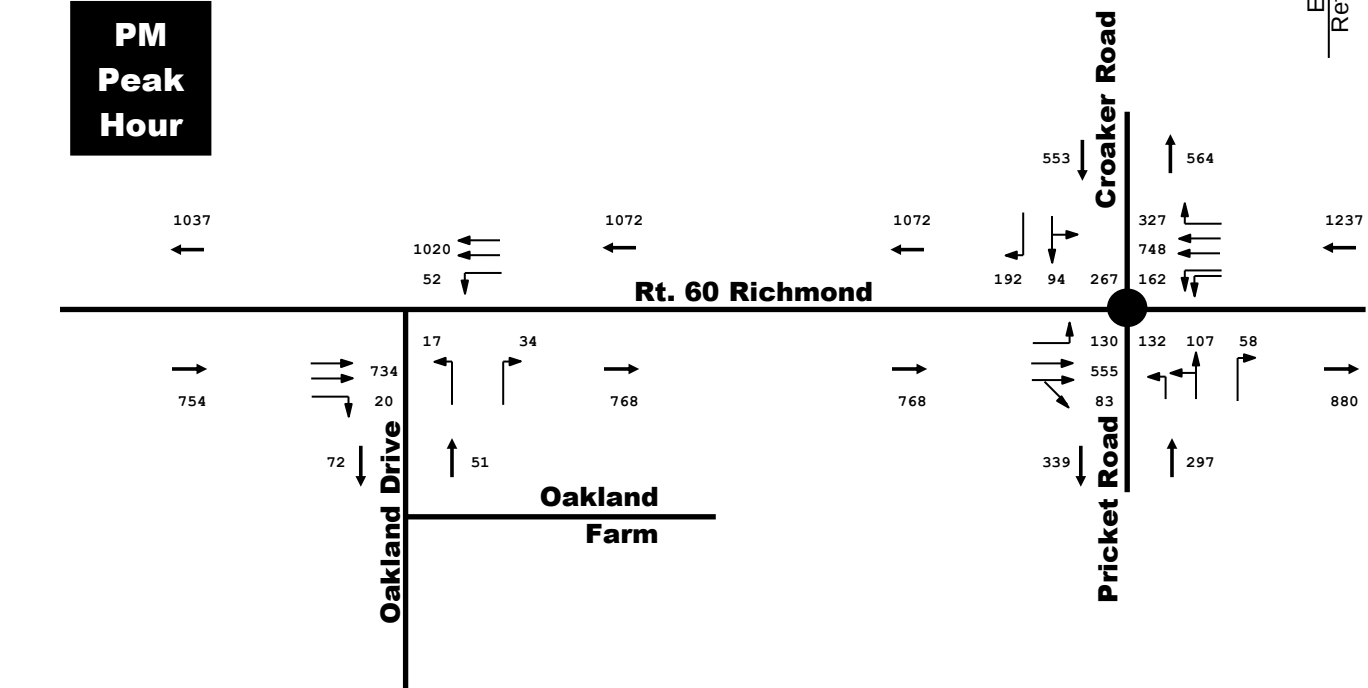
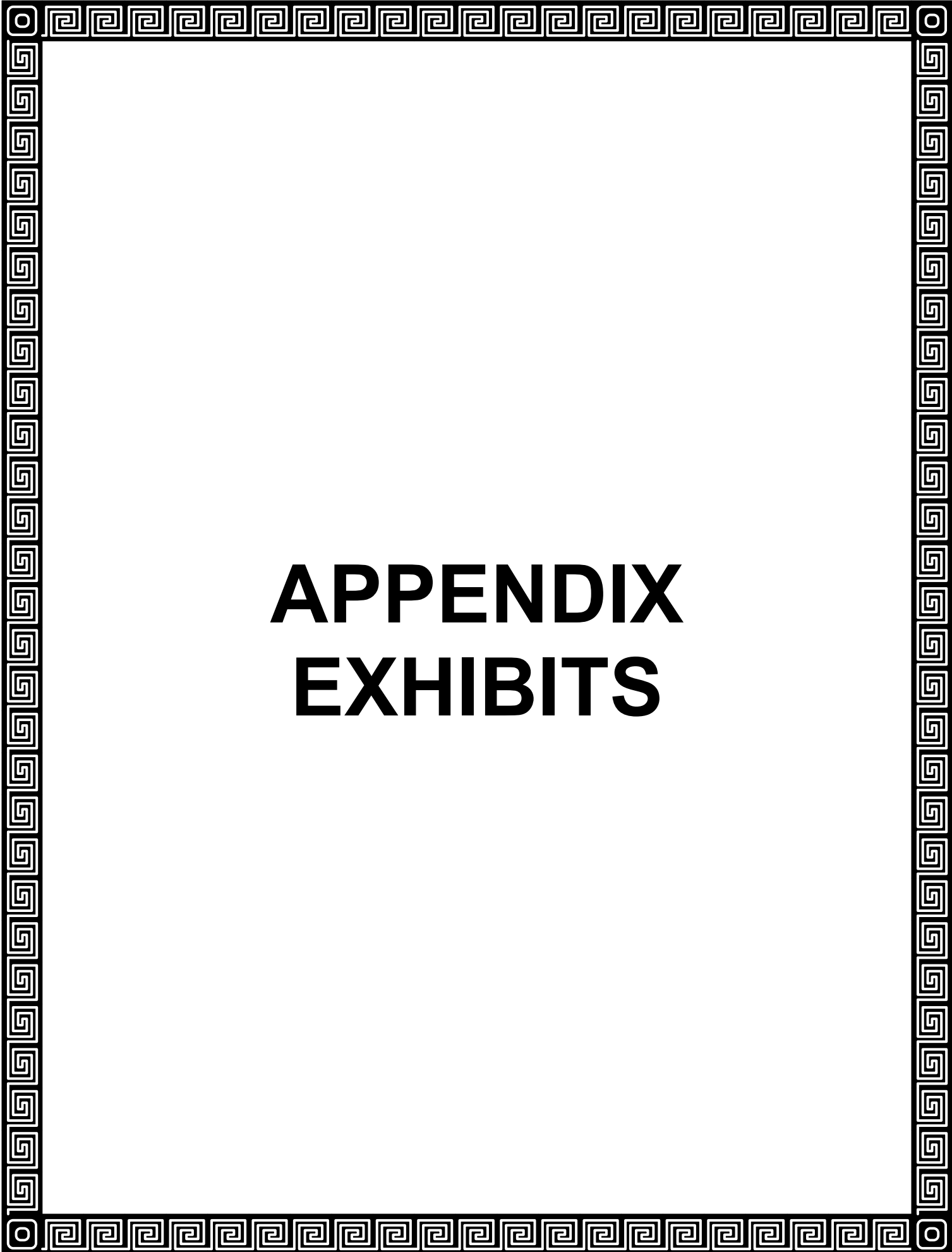


Exhibit Reference
N

2025 TOTAL PEAK HOUR TRAFFIC
WITH OAKLAND FARM APARTMENTS

DRW Consultants, LLC
804-794-7312

Exhibit 10



APPENDIX EXHIBITS

APPENDIX TABLE OF CONTENTS

APPENDIX EXHIBITS	Number
2017 Tabulated Total Traffic Counts:	AM PM
Rt. 60 Richmond Road/Croaker Road	A3 A6
Rt. 60 Richmond Road/Oakland Drive.....	B3 B6
2017 Tabulated Eastbound Left Turn Queues	AM PM
Rt. 60 Richmond Road/Croaker Road	C1 C2
2017 Counts Without Balance	AM PM
.....	D D
2017 Development Trip Distribution	AM PM
.....	E E
Turn Lane Warrants	AM PM
Rt. 60 Westbound Left Turn At Oakland Drive	F F
HCM 2000 Signalized Intersection LOS	AM PM
Existing.....	J1 J2
Rt. 60 Richmond Road/Croaker Road	Page 1
2025 Background.....	J3 J4
Rt. 60 Richmond Road/Croaker Road	Page 1
2025 With Site Existing Timing	J5 J6
Rt. 60 Richmond Road/Croaker Road	Page 1
2025 With Site Optimized Timing	J7 J8
Rt. 60 Richmond Road/Croaker Road	Page 1
Unsignalized LOS	AM PM
Existing.....	K1 K2
Rt. 60 Richmond Road/Oakland Drive.....	Page 1
2025 Background.....	K3 K4
Rt. 60 Richmond Road/Oakland Drive.....	Page 1
2025 With Site	K5 K6
Rt. 60 Richmond Road/Oakland Drive.....	Page 1
2025 With Site Optimized Signal Timing	K7 K8
Rt. 60 Richmond Road/Oakland Drive.....	Page 1
Synchro Queues	AM PM
Existing.....	L1 L2
Rt. 60 Richmond Road/Croaker Road	Page 1
2025 Background.....	L3 L4
Rt. 60 Richmond Road/Croaker Road	Page 1
2025 With Site – Existing Timing	L5 L6
Rt. 60 Richmond Road/Croaker Road	Page 1
2025 With Site – Optimized Timing.....	L7 L8
Rt. 60 Richmond Road/Croaker Road	Page 1
SimTraffic Queuing & Blocking Report	AM PM
Existing – 60 Minute Interval	M1 M2
Rt. 60 Richmond Road/Croaker Road	Page 1
Rt. 60 Richmond Road/Oakland Drive.....	Page 1
2025 Background.....	M3 M4
Rt. 60 Richmond Road/Croaker Road	Page 1
Rt. 60 Richmond Road/Oakland Drive.....	Page 1
2025 With Site – Existing Timing	M5 M6
Rt. 60 Richmond Road/Croaker Road	Page 1
Rt. 60 Richmond Road/Oakland Drive.....	Page 1
2025 With Site – Optimized Timing.....	M7 M8
Rt. 60 Richmond Road/Croaker Road	Page 1
Rt. 60 Richmond Road/Oakland Drive.....	Page 1

Peggy Malone & Associates, Inc.

(888) 247-8602

File Name : 1-Croaker Rd._Pricket Rd. & Richmond Rd. AM
 Site Code :
 Start Date : 10/10/2017
 Page No : 1

Groups Printed- Car

	Richmond Rd Eastbound					Richmond Rd Westbound					Pricket Rd Northbound					Croaker Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	77	132	5	1	215	4	70	44	0	118	2	7	1	1	11	41	2	52	0	95	439
07:15 AM	63	109	2	0	174	5	79	43	0	127	2	11	6	0	19	41	3	24	0	68	388
07:30 AM	39	147	5	0	191	5	61	29	0	95	3	4	10	0	17	43	1	23	0	67	370
07:45 AM	25	125	5	0	155	10	59	22	0	91	5	4	3	0	12	56	6	20	0	82	340
Total	204	513	17	1	735	24	269	138	0	431	12	26	20	1	59	181	12	119	0	312	1537
08:00 AM	28	111	4	0	143	18	59	37	0	114	2	3	4	0	9	51	4	18	0	73	339
08:15 AM	29	116	2	0	147	12	50	22	0	84	1	5	6	0	12	52	5	14	0	71	314
08:30 AM	21	133	12	0	166	14	52	19	0	85	8	2	5	0	15	65	6	17	0	88	354
08:45 AM	21	110	3	0	134	12	52	24	0	88	3	9	8	0	20	57	5	22	0	84	326
Total	99	470	21	0	590	56	213	102	0	371	14	19	23	0	56	225	20	71	0	316	1333
Grand Total	303	983	38	1	1325	80	482	240	0	802	26	45	43	1	115	406	32	190	0	628	2870
Apprch %	22.9	74.2	2.9	0.1		10	60.1	29.9	0		22.6	39.1	37.4	0.9		64.6	5.1	30.3	0		
Total %	10.6	34.3	1.3	0	46.2	2.8	16.8	8.4	0	27.9	0.9	1.6	1.5	0	4	14.1	1.1	6.6	0	21.9	

	Richmond Rd Eastbound				Richmond Rd Westbound				Pricket Rd Northbound				Croaker Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	77	132	5	214	4	70	44	118	2	7	1	10	41	2	52	95	437
07:15 AM	63	109	2	174	5	79	43	127	2	11	6	19	41	3	24	68	388
07:30 AM	39	147	5	191	5	61	29	95	3	4	10	17	43	1	23	67	370
07:45 AM	25	125	5	155	10	59	22	91	5	4	3	12	56	6	20	82	340
Total Volume	204	513	17	734	24	269	138	431	12	26	20	58	181	12	119	312	1535
% App. Total	27.8	69.9	2.3		5.6	62.4	32		20.7	44.8	34.5		58	3.8	38.1		
PHF	.662	.872	.850	.857	.600	.851	.784	.848	.600	.591	.500	.763	.808	.500	.572	.821	.878

Peggy Malone & Associates, Inc.

(888) 247-8602

File Name : 1-Croaker Rd._Pricket Rd. & Richmond Rd. AM
 Site Code :
 Start Date : 10/10/2017
 Page No : 1

Groups Printed- Truck

	Richmond Rd Eastbound					Richmond Rd Westbound					Pricket Rd Northbound					Croaker Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	5	7	2	0	14	0	2	1	0	3	0	0	0	0	0	2	1	4	0	7	24
07:15 AM	7	9	2	0	18	1	3	1	0	5	2	1	0	0	3	3	1	3	0	7	33
07:30 AM	3	4	1	0	8	1	7	4	0	12	0	2	0	0	2	2	0	4	0	6	28
07:45 AM	2	5	1	0	8	1	3	4	0	8	1	2	0	0	3	0	1	4	0	5	24
Total	17	25	6	0	48	3	15	10	0	28	3	5	0	0	8	7	3	15	0	25	109
08:00 AM	5	6	0	0	11	0	3	4	0	7	0	1	1	0	2	1	1	3	0	5	25
08:15 AM	5	4	1	0	10	1	2	3	0	6	0	1	0	0	1	3	0	2	0	5	22
08:30 AM	1	7	0	0	8	0	4	1	0	5	1	0	0	0	1	3	0	4	0	7	21
08:45 AM	2	11	1	0	14	2	3	2	0	7	2	0	0	0	2	2	1	3	0	6	29
Total	13	28	2	0	43	3	12	10	0	25	3	2	1	0	6	9	2	12	0	23	97
Grand Total	30	53	8	0	91	6	27	20	0	53	6	7	1	0	14	16	5	27	0	48	206
Apprch %	33	58.2	8.8	0		11.3	50.9	37.7	0		42.9	50	7.1	0		33.3	10.4	56.2	0		
Total %	14.6	25.7	3.9	0	44.2	2.9	13.1	9.7	0	25.7	2.9	3.4	0.5	0	6.8	7.8	2.4	13.1	0	23.3	

	Richmond Rd Eastbound				Richmond Rd Westbound				Pricket Rd Northbound				Croaker Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	7	9	2	18	1	3	1	5	2	1	0	3	3	1	3	7	33
07:30 AM	3	4	1	8	1	7	4	12	0	2	0	2	2	0	4	6	28
07:45 AM	2	5	1	8	1	3	4	8	1	2	0	3	0	1	4	5	24
08:00 AM	5	6	0	11	0	3	4	7	0	1	1	2	1	1	3	5	25
Total Volume	17	24	4	45	3	16	13	32	3	6	1	10	6	3	14	23	110
% App. Total	37.8	53.3	8.9		9.4	50	40.6		30	60	10		26.1	13	60.9		
PHF	.607	.667	.500	.625	.750	.571	.813	.667	.375	.750	.250	.833	.500	.750	.875	.821	.833

Peggy Malone & Associates, Inc.

(888) 247-8602

File Name : 1-Croaker Rd._Pricket Rd. & Richmond Rd. AM
 Site Code :
 Start Date : 10/10/2017
 Page No : 1

Groups Printed- Car - Truck

	Richmond Rd Eastbound					Richmond Rd Westbound					Pricket Rd Northbound					Croaker Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	82	139	7	1	229	4	72	45	0	121	2	7	1	1	11	43	3	56	0	102	463
07:15 AM	70	118	4	0	192	6	82	44	0	132	4	12	6	0	22	44	4	27	0	75	421
07:30 AM	42	151	6	0	199	6	68	33	0	107	3	6	10	0	19	45	1	27	0	73	398
07:45 AM	27	130	6	0	163	11	62	26	0	99	6	6	3	0	15	56	7	24	0	87	364
Total	221	538	23	1	783	27	284	148	0	459	15	31	20	1	67	188	15	134	0	337	1646
08:00 AM	33	117	4	0	154	18	62	41	0	121	2	4	5	0	11	52	5	21	0	78	364
08:15 AM	34	120	3	0	157	13	52	25	0	90	1	6	6	0	13	55	5	16	0	76	336
08:30 AM	22	140	12	0	174	14	56	20	0	90	9	2	5	0	16	68	6	21	0	95	375
08:45 AM	23	121	4	0	148	14	55	26	0	95	5	9	8	0	22	59	6	25	0	90	355
Total	112	498	23	0	633	59	225	112	0	396	17	21	24	0	62	234	22	83	0	339	1430
Grand Total	333	1036	46	1	1416	86	509	260	0	855	32	52	44	1	129	422	37	217	0	676	3076
Apprch %	23.5	73.2	3.2	0.1		10.1	59.5	30.4	0		24.8	40.3	34.1	0.8		62.4	5.5	32.1	0		
Total %	10.8	33.7	1.5	0	46	2.8	16.5	8.5	0	27.8	1	1.7	1.4	0	4.2	13.7	1.2	7.1	0	22	
Car	303	983	38	1	1325	80	482	240	0	802	26	45	43	1	115	406	32	190	0	628	2870
% Car	91	94.9	82.6	100	93.6	93	94.7	92.3	0	93.8	81.2	86.5	97.7	100	89.1	96.2	86.5	87.6	0	92.9	93.3
Truck	30	53	8	0	91	6	27	20	0	53	6	7	1	0	14	16	5	27	0	48	206
% Truck	9	5.1	17.4	0	6.4	7	5.3	7.7	0	6.2	18.8	13.5	2.3	0	10.9	3.8	13.5	12.4	0	7.1	6.7

	Richmond Rd Eastbound				Richmond Rd Westbound				Pricket Rd Northbound				Croaker Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	82	139	7	228	4	72	45	121	2	7	1	10	43	3	56	102	461
07:15 AM	70	118	4	192	6	82	44	132	4	12	6	22	44	4	27	75	421
07:30 AM	42	151	6	199	6	68	33	107	3	6	10	19	45	1	27	73	398
07:45 AM	27	130	6	163	11	62	26	99	6	6	3	15	56	7	24	87	364
Total Volume	221	538	23	782	27	284	148	459	15	31	20	66	188	15	134	337	1644
% App. Total	28.3	68.8	2.9		5.9	61.9	32.2		22.7	47	30.3		55.8	4.5	39.8		
PHF	.674	.891	.821	.857	.614	.866	.822	.869	.625	.646	.500	.750	.839	.536	.598	.826	.892
Truck %	8	5	26		11	5	7		20	16	0		4	20	11		

Peggy Malone & Associates, Inc.

(888) 247-8602

File Name : 1-Croaker Rd._Pricket Rd. & Richmond Rd. PM
 Site Code :
 Start Date : 10/10/2017
 Page No : 1

Groups Printed- Car

	Richmond Rd Eastbound					Richmond Rd Westbound					Pricket Rd Northbound					Croaker Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	28	102	8	0	138	21	152	66	0	239	20	12	7	0	39	68	10	35	0	113	529
04:15 PM	21	110	10	0	141	36	136	56	0	228	25	15	5	0	45	52	15	33	0	100	514
04:30 PM	41	88	7	0	136	34	171	65	0	270	20	19	7	0	46	60	24	55	0	139	591
04:45 PM	30	120	17	0	167	27	174	80	0	281	23	27	16	0	66	52	19	47	0	118	632
Total	120	420	42	0	582	118	633	267	0	1018	88	73	35	0	196	232	68	170	0	470	2266
05:00 PM	34	129	18	0	181	29	148	77	0	254	25	12	13	0	50	63	11	32	1	107	592
05:15 PM	25	121	13	0	159	36	163	65	1	265	29	23	8	0	60	57	21	38	0	116	600
05:30 PM	23	126	12	0	161	36	134	78	1	249	34	28	3	0	65	72	22	38	0	132	607
05:45 PM	16	119	15	0	150	29	158	59	1	247	26	14	13	0	53	68	19	33	0	120	570
Total	98	495	58	0	651	130	603	279	3	1015	114	77	37	0	228	260	73	141	1	475	2369
Grand Total	218	915	100	0	1233	248	1236	546	3	2033	202	150	72	0	424	492	141	311	1	945	4635
Apprch %	17.7	74.2	8.1	0		12.2	60.8	26.9	0.1		47.6	35.4	17	0		52.1	14.9	32.9	0.1		
Total %	4.7	19.7	2.2	0	26.6	5.4	26.7	11.8	0.1	43.9	4.4	3.2	1.6	0	9.1	10.6	3	6.7	0	20.4	

	Richmond Rd Eastbound				Richmond Rd Westbound				Pricket Rd Northbound				Croaker Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	30	120	17	167	27	174	80	281	23	27	16	66	52	19	47	118	632
05:00 PM	34	129	18	181	29	148	77	254	25	12	13	50	63	11	32	106	591
05:15 PM	25	121	13	159	36	163	65	264	29	23	8	60	57	21	38	116	599
05:30 PM	23	126	12	161	36	134	78	248	34	28	3	65	72	22	38	132	606
Total Volume	112	496	60	668	128	619	300	1047	111	90	40	241	244	73	155	472	2428
% App. Total	16.8	74.3	9		12.2	59.1	28.7		46.1	37.3	16.6		51.7	15.5	32.8		
PHF	.824	.961	.833	.923	.889	.889	.938	.931	.816	.804	.625	.913	.847	.830	.824	.894	.960

Peggy Malone & Associates, Inc.

(888) 247-8602

File Name : 1-Croaker Rd._Pricket Rd. & Richmond Rd. PM
 Site Code :
 Start Date : 10/10/2017
 Page No : 1

Groups Printed- Truck

	Richmond Rd Eastbound					Richmond Rd Westbound					Pricket Rd Northbound					Croaker Rd Southbound						
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total	
04:00 PM	0	5	0	0	5	0	4	1	0	5	0	0	0	0	0	0	1	1	0	0	2	12
04:15 PM	0	2	0	0	2	1	3	5	0	9	0	1	1	0	2	1	0	2	0	3	16	
04:30 PM	1	1	0	0	2	1	3	2	0	6	0	0	0	0	0	0	0	3	0	3	11	
04:45 PM	1	4	0	0	5	0	7	1	0	8	0	0	1	0	1	1	0	2	0	3	17	
Total	2	12	0	0	14	2	17	9	0	28	0	1	2	0	3	2	1	8	0	11	56	
05:00 PM	1	2	0	0	3	1	1	0	0	2	1	0	0	0	1	2	0	6	0	8	14	
05:15 PM	0	1	0	0	1	1	1	1	0	3	0	1	0	0	1	0	0	3	0	3	8	
05:30 PM	0	1	0	0	1	0	2	1	0	3	0	0	0	0	0	0	0	1	0	1	5	
05:45 PM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	1	0	1	0	2	4	
Total	1	5	0	0	6	2	5	2	0	9	1	1	0	0	2	3	0	11	0	14	31	
Grand Total	3	17	0	0	20	4	22	11	0	37	1	2	2	0	5	5	1	19	0	25	87	
Apprch %	15	85	0	0		10.8	59.5	29.7	0		20	40	40	0		20	4	76	0			
Total %	3.4	19.5	0	0	23	4.6	25.3	12.6	0	42.5	1.1	2.3	2.3	0	5.7	5.7	1.1	21.8	0	28.7		

	Richmond Rd Eastbound				Richmond Rd Westbound				Pricket Rd Northbound				Croaker Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	0	2	0	2	1	3	5	9	0	1	1	2	1	0	2	3	16
04:30 PM	1	1	0	2	1	3	2	6	0	0	0	0	0	0	3	3	11
04:45 PM	1	4	0	5	0	7	1	8	0	0	1	1	1	0	2	3	17
05:00 PM	1	2	0	3	1	1	0	2	1	0	0	1	2	0	6	8	14
Total Volume	3	9	0	12	3	14	8	25	1	1	2	4	4	0	13	17	58
% App. Total	25	75	0		12	56	32		25	25	50		23.5	0	76.5		
PHF	.750	.563	.000	.600	.750	.500	.400	.694	.250	.250	.500	.500	.500	.000	.542	.531	.853

Peggy Malone & Associates, Inc.

(888) 247-8602

File Name : 1-Croaker Rd._Pricket Rd. & Richmond Rd. PM
 Site Code :
 Start Date : 10/10/2017
 Page No : 1

Groups Printed- Car - Truck

	Richmond Rd Eastbound					Richmond Rd Westbound					Pricket Rd Northbound					Croaker Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	28	107	8	0	143	21	156	67	0	244	20	12	7	0	39	68	11	36	0	115	541
04:15 PM	21	112	10	0	143	37	139	61	0	237	25	16	6	0	47	53	15	35	0	103	530
04:30 PM	42	89	7	0	138	35	174	67	0	276	20	19	7	0	46	60	24	58	0	142	602
04:45 PM	31	124	17	0	172	27	181	81	0	289	23	27	17	0	67	53	19	49	0	121	649
Total	122	432	42	0	596	120	650	276	0	1046	88	74	37	0	199	234	69	178	0	481	2322
05:00 PM	35	131	18	0	184	30	149	77	0	256	26	12	13	0	51	65	11	38	1	115	606
05:15 PM	25	122	13	0	160	37	164	66	1	268	29	24	8	0	61	57	21	41	0	119	608
05:30 PM	23	127	12	0	162	36	136	79	1	252	34	28	3	0	65	72	22	39	0	133	612
05:45 PM	16	120	15	0	151	29	159	59	1	248	26	14	13	0	53	69	19	34	0	122	574
Total	99	500	58	0	657	132	608	281	3	1024	115	78	37	0	230	263	73	152	1	489	2400
Grand Total	221	932	100	0	1253	252	1258	557	3	2070	203	152	74	0	429	497	142	330	1	970	4722
Apprch %	17.6	74.4	8	0		12.2	60.8	26.9	0.1		47.3	35.4	17.2	0		51.2	14.6	34	0.1		
Total %	4.7	19.7	2.1	0	26.5	5.3	26.6	11.8	0.1	43.8	4.3	3.2	1.6	0	9.1	10.5	3	7	0	20.5	
Car	218	915	100	0	1233	248	1236	546	3	2033	202	150	72	0	424	492	141	311	1	945	4635
% Car	98.6	98.2	100	0	98.4	98.4	98.3	98	100	98.2	99.5	98.7	97.3	0	98.8	99	99.3	94.2	100	97.4	98.2
Truck	3	17	0	0	20	4	22	11	0	37	1	2	2	0	5	5	1	19	0	25	87
% Truck	1.4	1.8	0	0	1.6	1.6	1.7	2	0	1.8	0.5	1.3	2.7	0	1.2	1	0.7	5.8	0	2.6	1.8

	Richmond Rd Eastbound				Richmond Rd Westbound				Pricket Rd Northbound				Croaker Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	31	124	17	172	27	181	81	289	23	27	17	67	53	19	49	121	649
05:00 PM	35	131	18	184	30	149	77	256	26	12	13	51	65	11	38	114	605
05:15 PM	25	122	13	160	37	164	66	267	29	24	8	61	57	21	41	119	607
05:30 PM	23	127	12	162	36	136	79	251	34	28	3	65	72	22	39	133	611
Total Volume	114	504	60	678	130	630	303	1063	112	91	41	244	247	73	167	487	2472
% App. Total	16.8	74.3	8.8		12.2	59.3	28.5		45.9	37.3	16.8		50.7	15	34.3		
PHF	.814	.962	.833	.921	.878	.870	.935	.920	.824	.813	.603	.910	.858	.830	.852	.915	.952
Truck %v	2	2	0		2	2	1		1	1	2		1	0	7		

Peggy Malone & Associates, Inc.
(888) 247-8602

File Name : 2-Oakland Rd. & Richmond Rd. AM
Site Code :
Start Date : 10/10/2017
Page No : 1

Groups Printed- Car

	Richmond Rd Eastbound				Richmond Rd Westbound				Oakland Dr Northbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
07:00 AM	208	0	0	208	2	118	1	121	1	2	1	4	333
07:15 AM	168	0	0	168	2	95	0	97	1	1	0	2	267
07:30 AM	181	1	0	182	0	92	0	92	0	4	0	4	278
07:45 AM	148	0	0	148	0	86	0	86	3	4	0	7	241
Total	705	1	0	706	4	391	1	396	5	11	1	17	1119
08:00 AM	144	0	0	144	0	81	0	81	0	2	0	2	227
08:15 AM	150	0	0	150	1	60	0	61	1	2	3	6	217
08:30 AM	164	0	0	164	0	78	0	78	0	2	0	2	244
08:45 AM	141	0	0	141	0	78	0	78	1	3	0	4	223
Total	599	0	0	599	1	297	0	298	2	9	3	14	911
Grand Total	1304	1	0	1305	5	688	1	694	7	20	4	31	2030
Apprch %	99.9	0.1	0		0.7	99.1	0.1		22.6	64.5	12.9		
Total %	64.2	0	0	64.3	0.2	33.9	0	34.2	0.3	1	0.2	1.5	

	Richmond Rd Eastbound			Richmond Rd Westbound			Oakland Dr Northbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	208	0	208	2	118	120	1	2	3	331
07:15 AM	168	0	168	2	95	97	1	1	2	267
07:30 AM	181	1	182	0	92	92	0	4	4	278
07:45 AM	148	0	148	0	86	86	3	4	7	241
Total Volume	705	1	706	4	391	395	5	11	16	1117
% App. Total	99.9	0.1		1	99		31.2	68.8		
PHF	.847	.250	.849	.500	.828	.823	.417	.688	.571	.844

Peggy Malone & Associates, Inc.
(888) 247-8602

File Name : 2-Oakland Rd. & Richmond Rd. AM
Site Code :
Start Date : 10/10/2017
Page No : 1

Groups Printed- Truck

Start Time	Richmond Rd Eastbound				Richmond Rd Westbound				Oakland Dr Northbound				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	
07:00 AM	14	1	0	15	0	7	0	7	1	0	0	1	23
07:15 AM	18	0	0	18	0	7	0	7	0	0	0	0	25
07:30 AM	10	0	0	10	0	11	0	11	0	0	0	0	21
07:45 AM	7	0	0	7	0	7	0	7	0	0	0	0	14
Total	49	1	0	50	0	32	0	32	1	0	0	1	83
08:00 AM	11	0	0	11	0	6	0	6	0	0	0	0	17
08:15 AM	10	2	0	12	0	4	0	4	0	0	0	0	16
08:30 AM	8	0	0	8	0	10	0	10	0	0	0	0	18
08:45 AM	13	1	0	14	0	7	0	7	0	1	0	1	22
Total	42	3	0	45	0	27	0	27	0	1	0	1	73
Grand Total	91	4	0	95	0	59	0	59	1	1	0	2	156
Apprch %	95.8	4.2	0		0	100	0		50	50	0		
Total %	58.3	2.6	0	60.9	0	37.8	0	37.8	0.6	0.6	0	1.3	

	Richmond Rd Eastbound			Richmond Rd Westbound			Oakland Dr Northbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	14	1	15	0	7	7	1	0	1	23
07:15 AM	18	0	18	0	7	7	0	0	0	25
07:30 AM	10	0	10	0	11	11	0	0	0	21
07:45 AM	7	0	7	0	7	7	0	0	0	14
Total Volume	49	1	50	0	32	32	1	0	1	83
% App. Total	98	2		0	100		100	0		
PHF	.681	.250	.694	.000	.727	.727	.250	.000	.250	.830

Peggy Malone & Associates, Inc.
(888) 247-8602

File Name : 2-Oakland Rd. & Richmond Rd. AM
 Site Code :
 Start Date : 10/10/2017
 Page No : 1

Groups Printed- Car - Truck

	Richmond Rd Eastbound				Richmond Rd Westbound				Oakland Dr Northbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
07:00 AM	222	1	0	223	2	125	1	128	2	2	1	5	356
07:15 AM	186	0	0	186	2	102	0	104	1	1	0	2	292
07:30 AM	191	1	0	192	0	103	0	103	0	4	0	4	299
07:45 AM	155	0	0	155	0	93	0	93	3	4	0	7	255
Total	754	2	0	756	4	423	1	428	6	11	1	18	1202
08:00 AM	155	0	0	155	0	87	0	87	0	2	0	2	244
08:15 AM	160	2	0	162	1	64	0	65	1	2	3	6	233
08:30 AM	172	0	0	172	0	88	0	88	0	2	0	2	262
08:45 AM	154	1	0	155	0	85	0	85	1	4	0	5	245
Total	641	3	0	644	1	324	0	325	2	10	3	15	984
Grand Total	1395	5	0	1400	5	747	1	753	8	21	4	33	2186
Apprch %	99.6	0.4	0		0.7	99.2	0.1		24.2	63.6	12.1		
Total %	63.8	0.2	0	64	0.2	34.2	0	34.4	0.4	1	0.2	1.5	
Car	1304	1	0	1305	5	688	1	694	7	20	4	31	2030
% Car	93.5	20	0	93.2	100	92.1	100	92.2	87.5	95.2	100	93.9	92.9
Truck	91	4	0	95	0	59	0	59	1	1	0	2	156
% Truck	6.5	80	0	6.8	0	7.9	0	7.8	12.5	4.8	0	6.1	7.1

	Richmond Rd Eastbound			Richmond Rd Westbound			Oakland Dr Northbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	222	1	223	2	125	127	2	2	4	354
07:15 AM	186	0	186	2	102	104	1	1	2	292
07:30 AM	191	1	192	0	103	103	0	4	4	299
07:45 AM	155	0	155	0	93	93	3	4	7	255
Total Volume	754	2	756	4	423	427	6	11	17	1200
% App. Total	99.7	0.3		0.9	99.1		35.3	64.7		
PHF	.849	.500	.848	.500	.846	.841	.500	.688	.607	.847

TRUCK % 7 5 0 7 17 0

Peggy Malone & Associates, Inc.
(888) 247-8602

File Name : 2-Oakland Rd. & Richmond Rd. PM
Site Code :
Start Date : 10/10/2017
Page No : 1

Groups Printed- Car

Start Time	Richmond Rd Eastbound				Richmond Rd Westbound				Oakland Dr Northbound				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	
04:00 PM	140	0	0	140	3	202	0	205	0	0	0	0	345
04:15 PM	143	2	0	145	1	198	0	199	0	1	0	1	345
04:30 PM	137	0	0	137	4	246	0	250	1	2	0	3	390
04:45 PM	154	2	0	156	6	227	0	233	0	6	0	6	395
Total	574	4	0	578	14	873	0	887	1	9	0	10	1475
05:00 PM	180	0	0	180	7	200	0	207	1	2	0	3	390
05:15 PM	154	1	0	155	1	235	0	236	3	4	0	7	398
05:30 PM	173	0	0	173	5	199	0	204	0	5	0	5	382
05:45 PM	129	1	0	130	2	210	0	212	0	4	0	4	346
Total	636	2	0	638	15	844	0	859	4	15	0	19	1516
Grand Total	1210	6	0	1216	29	1717	0	1746	5	24	0	29	2991
Apprch %	99.5	0.5	0		1.7	98.3	0		17.2	82.8	0		
Total %	40.5	0.2	0	40.7	1	57.4	0	58.4	0.2	0.8	0	1	

	Richmond Rd Eastbound			Richmond Rd Westbound			Oakland Dr Northbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	137	0	137	4	246	250	1	2	3	390
04:45 PM	154	2	156	6	227	233	0	6	6	395
05:00 PM	180	0	180	7	200	207	1	2	3	390
05:15 PM	154	1	155	1	235	236	3	4	7	398
Total Volume	625	3	628	18	908	926	5	14	19	1573
% App. Total	99.5	0.5		1.9	98.1		26.3	73.7		
PHF	.868	.375	.872	.643	.923	.926	.417	.583	.679	.988

Peggy Malone & Associates, Inc.
(888) 247-8602

File Name : 2-Oakland Rd. & Richmond Rd. PM
 Site Code :
 Start Date : 10/10/2017
 Page No : 1

Groups Printed- Truck

	Richmond Rd Eastbound				Richmond Rd Westbound				Oakland Dr Northbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
04:00 PM	6	0	0	6	0	6	0	6	0	0	0	0	12
04:15 PM	2	0	0	2	0	4	0	4	0	0	0	0	6
04:30 PM	2	0	0	2	0	6	0	6	0	0	0	0	8
04:45 PM	4	2	0	6	0	9	0	9	1	1	0	2	17
Total	14	2	0	16	0	25	0	25	1	1	0	2	43
05:00 PM	1	0	0	1	1	8	0	9	0	0	0	0	10
05:15 PM	2	0	0	2	0	3	0	3	1	0	0	1	6
05:30 PM	1	0	0	1	0	2	0	2	0	0	0	0	3
05:45 PM	2	0	0	2	0	2	0	2	0	0	0	0	4
Total	6	0	0	6	1	15	0	16	1	0	0	1	23
Grand Total	20	2	0	22	1	40	0	41	2	1	0	3	66
Apprch %	90.9	9.1	0		2.4	97.6	0		66.7	33.3	0		
Total %	30.3	3	0	33.3	1.5	60.6	0	62.1	3	1.5	0	4.5	

	Richmond Rd Eastbound			Richmond Rd Westbound			Oakland Dr Northbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	6	0	6	0	6	6	0	0	0	12
04:15 PM	2	0	2	0	4	4	0	0	0	6
04:30 PM	2	0	2	0	6	6	0	0	0	8
04:45 PM	4	2	6	0	9	9	1	1	2	17
Total Volume	14	2	16	0	25	25	1	1	2	43
% App. Total	87.5	12.5		0	100		50	50		
PHF	.583	.250	.667	.000	.694	.694	.250	.250	.250	.632

Peggy Malone & Associates, Inc.
(888) 247-8602

File Name : 2-Oakland Rd. & Richmond Rd. PM
Site Code :
Start Date : 10/10/2017
Page No : 1

Groups Printed- Car - Truck

	Richmond Rd Eastbound				Richmond Rd Westbound				Oakland Dr Northbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
04:00 PM	146	0	0	146	3	208	0	211	0	0	0	0	357
04:15 PM	145	2	0	147	1	202	0	203	0	1	0	1	351
04:30 PM	139	0	0	139	4	252	0	256	1	2	0	3	398
04:45 PM	158	4	0	162	6	236	0	242	1	7	0	8	412
Total	588	6	0	594	14	898	0	912	2	10	0	12	1518
05:00 PM	181	0	0	181	8	208	0	216	1	2	0	3	400
05:15 PM	156	1	0	157	1	238	0	239	4	4	0	8	404
05:30 PM	174	0	0	174	5	201	0	206	0	5	0	5	385
05:45 PM	131	1	0	132	2	212	0	214	0	4	0	4	350
Total	642	2	0	644	16	859	0	875	5	15	0	20	1539
Grand Total	1230	8	0	1238	30	1757	0	1787	7	25	0	32	3057
Apprch %	99.4	0.6	0		1.7	98.3	0		21.9	78.1	0		
Total %	40.2	0.3	0	40.5	1	57.5	0	58.5	0.2	0.8	0	1	
Car	1210	6	0	1216	29	1717	0	1746	5	24	0	29	2991
% Car	98.4	75	0	98.2	96.7	97.7	0	97.7	71.4	96	0	90.6	97.8
Truck	20	2	0	22	1	40	0	41	2	1	0	3	66
% Truck	1.6	25	0	1.8	3.3	2.3	0	2.3	28.6	4	0	9.4	2.2

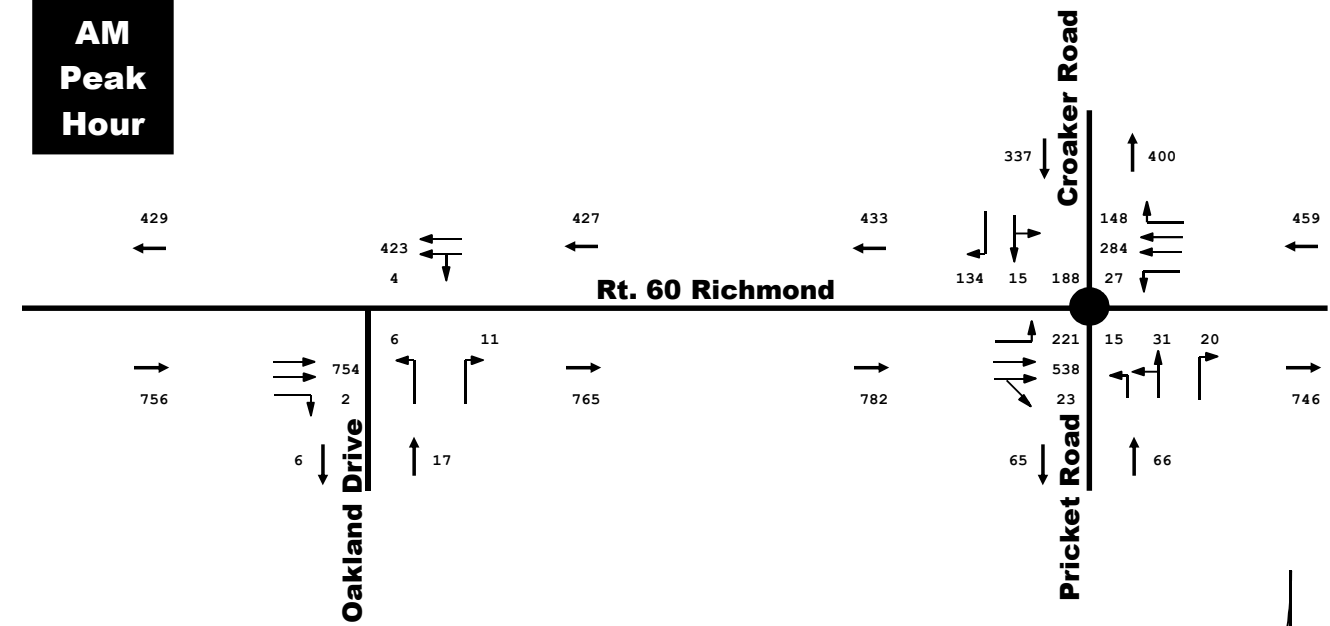
	Richmond Rd Eastbound			Richmond Rd Westbound			Oakland Dr Northbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	139	0	139	4	252	256	1	2	3	398
04:45 PM	158	4	162	6	236	242	1	7	8	412
05:00 PM	181	0	181	8	208	216	1	2	3	400
05:15 PM	156	1	157	1	238	239	4	4	8	404
Total Volume	634	5	639	19	934	953	7	15	22	1614
% App. Total	99.2	0.8		2	98		31.8	68.2		
PHF	.876	.313	.883	.594	.927	.931	.438	.536	.688	.979

TRUCK %	1	40	5	3	29	7
---------	---	----	---	---	----	---

Date:	10/10/2017	Observer: K. Leigh
Intersection Name: Croaker Rd. & US60 Eastbound Left Queue		
AM Shift: 7:00-9:00 AM		
	Approach: US60 EB	
	Left (1 lane)	
Time:	# veh	distance (feet)
7:00	5	125
	6	150
	7	175
	5	125
	4	100
	8	250
	6	200
	4	100
	8	200
	5	125
	8	225
7:15	4	150
	9	250
	7	200
	6	175
	10	250
	4	100
	6	150
	5	125
	4	125
	3	75
7:30	1	25
	3	75
	2	50
	1	25
	3	100
	5	125
	3	75
	3	75
	8	250
	4	125
	4	125
	5	175
7:45	2	50
	2	50
	2	50
	2	50
	4	100
	3	100
	1	25
	1	25
	1	25
Average	4	121
PM Peak 50th Percentile	4	125
PM Peak 95th Percentile	8	250
		Exhibit C1

Date:	10/10/2017	Observer: K. Leigh
Intersection Name:		
PM SHIFT 4:00-6:00 PM		
	Approach: US60 EB	
	Left (1 lane)	
Time:	# veh	distance (feet)
4:45	1	25
	4	100
	7	175
	3	75
	1	75
	4	100
	4	100
	1	25
	5	150
5:00	7	175
	6	150
	5	125
	6	150
	2	50
	4	100
5:15	4	100
	5	125
	5	125
	2	50
	3	75
	4	100
	3	75
	3	75
5:30	1	25
	4	100
	3	75
	2	50
	2	50
	2	50
	2	50
	5	125
	4	100
Average	3	91
AM Peak 50th Percentile	4	100
AM Peak 95th Percentile	6	161
		Exhibit C2

**AM
Peak
Hour**



TO

**PM
Peak
Hour**

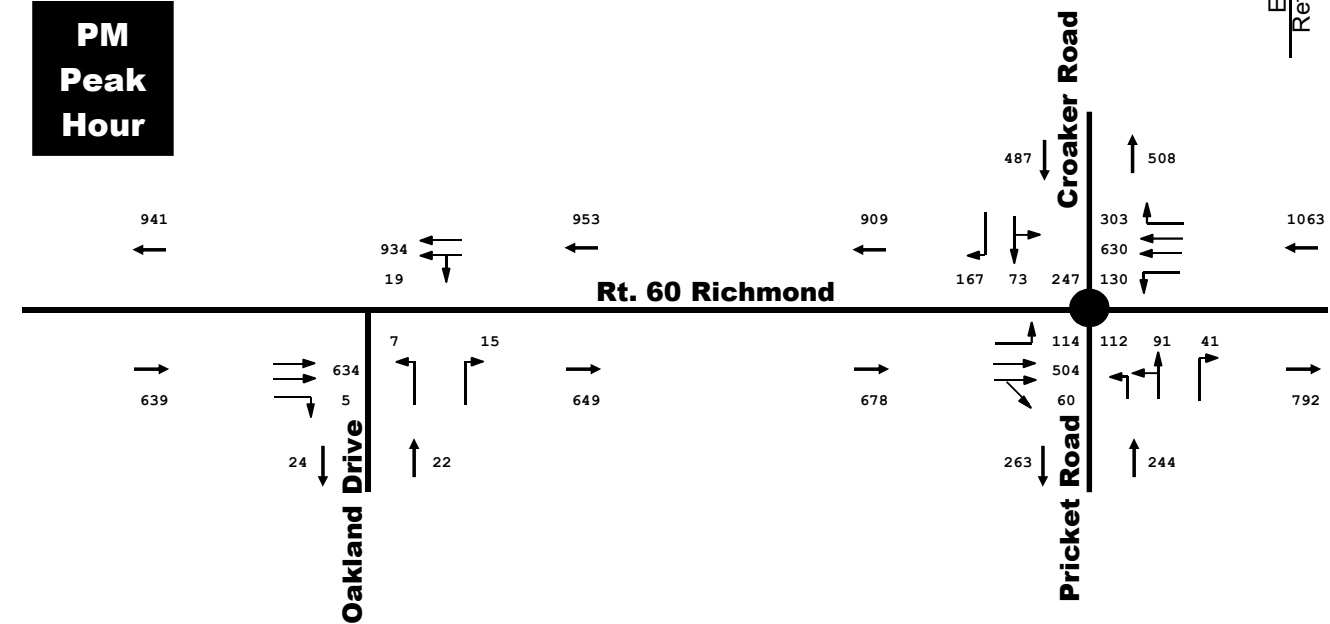


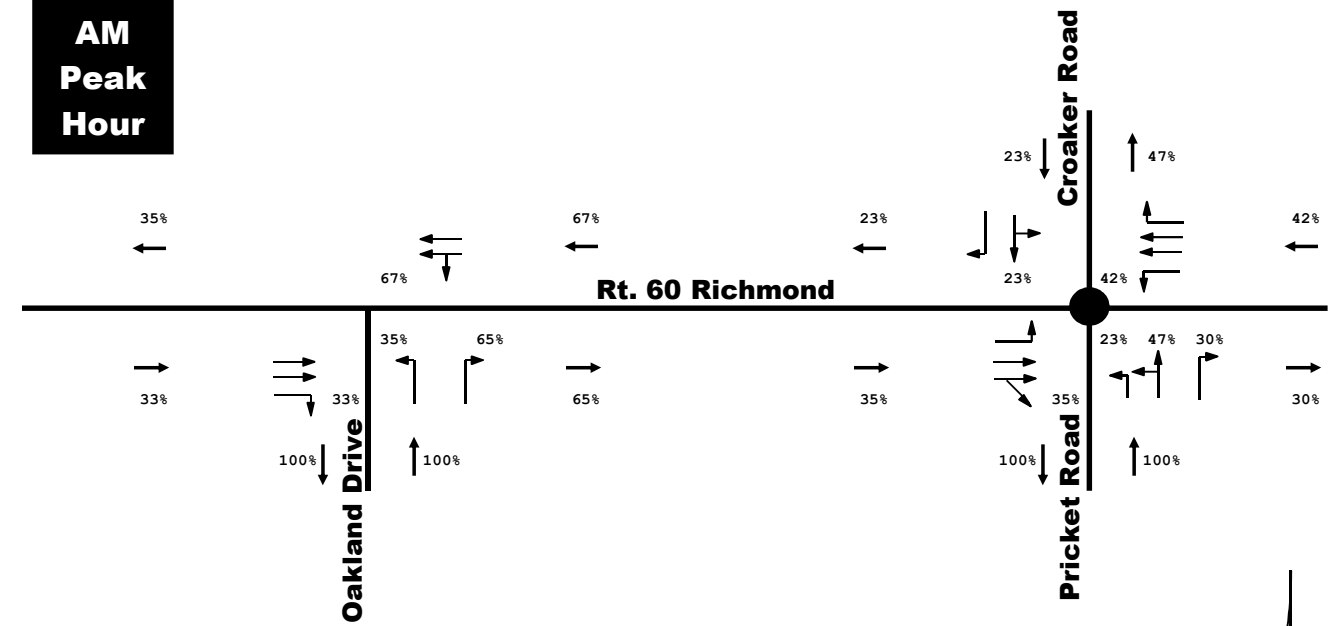
Exhibit
Reference

2017 PEAK HOUR COUNTS
WITHOUT BALANCE

DRW Consultants, LLC
804-794-7312

Exhibit D

**AM
Peak
Hour**



TO →

**PM
Peak
Hour**

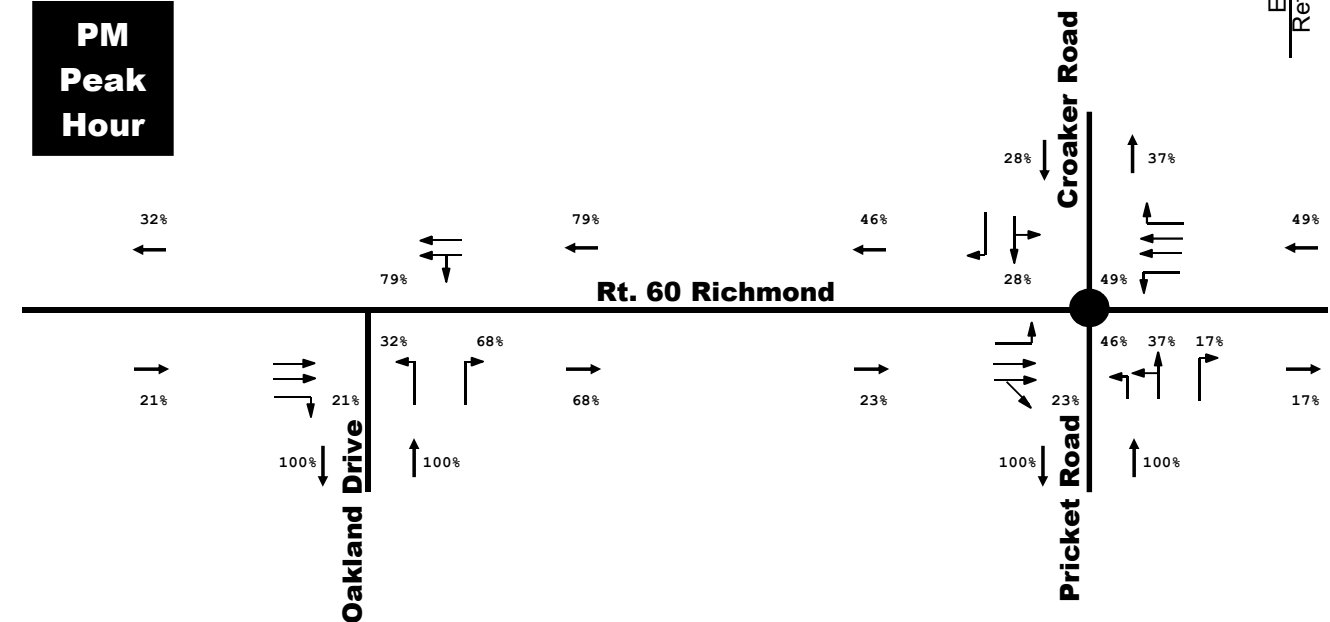


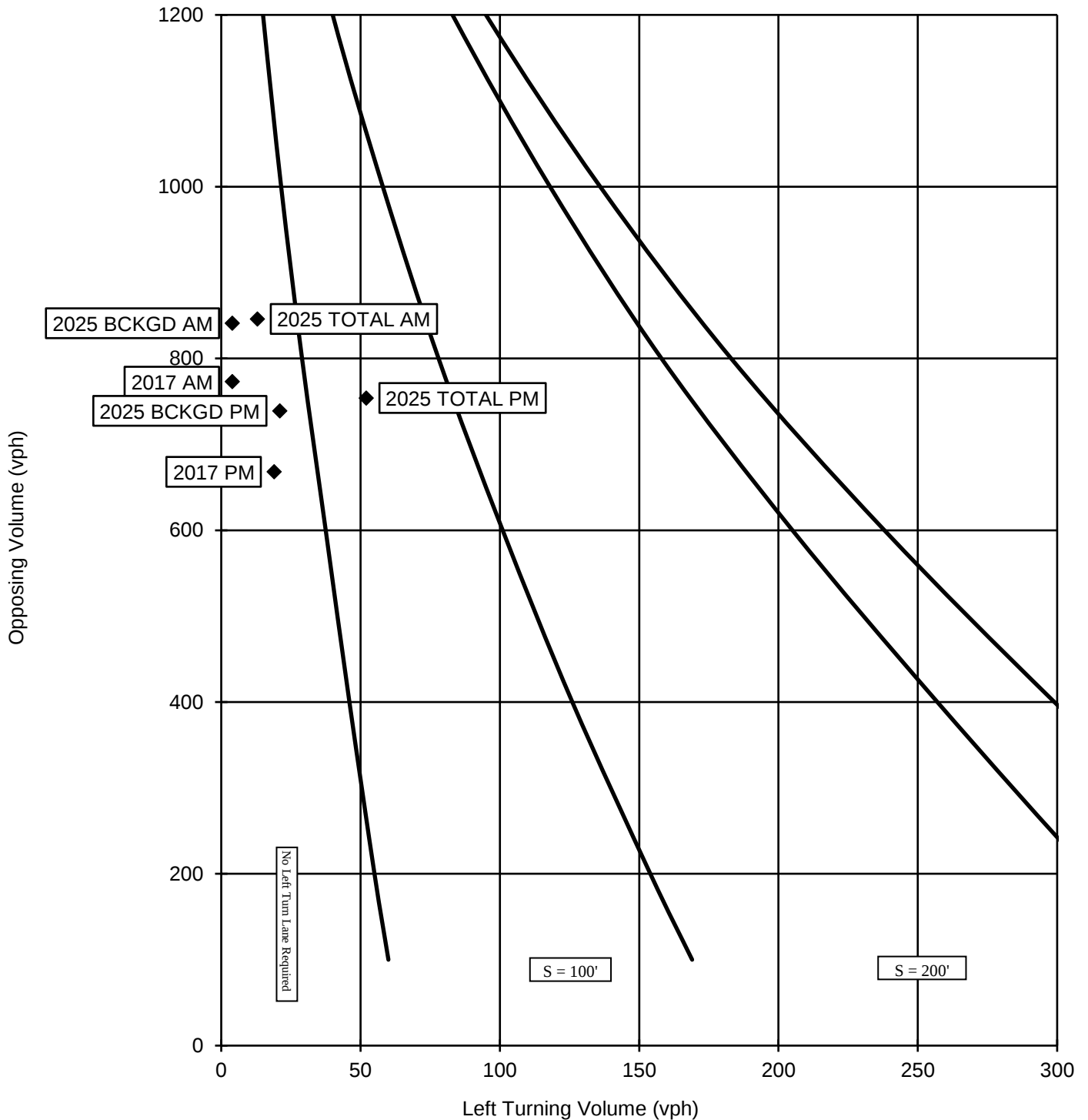
Exhibit
Reference

2017 PEAK HOUR COUNTS
TRIP DISTRIBUTION

DRW Consultants, LLC
804-794-7312

Exhibit E

LEFT TURN LANE WARRANT
FOUR LANE HIGHWAY
DIVIDED
S = Left Turn Storage



Source: VDOT Road Design Manual, Appendix C, derived from Highway Research Record Number 211

VDOT LEFT TURN LANE WARRANT
WESTBOUND LEFT TURN ON RT. 60
AT OAKLAND DRIVE

DRW Consultants, LLC
804-794-7312

Exhibit F

HCM Signalized Intersection Capacity Analysis

1: Croaker Road & Rt. 60/Richmond Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	538	23	27	284	148	15	31	20	188	15	134
Future Volume (vph)	221	538	23	27	284	148	15	31	20	188	15	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1671	3438	1282	3155	3438	1509	1429	1556	1615		1727	1455
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1671	3438	1282	3155	3438	1509	1429	1556	1615		1727	1455
Peak-hour factor, PHF	0.86	0.86	0.86	0.87	0.87	0.87	0.75	0.75	0.75	0.83	0.83	0.83
Adj. Flow (vph)	257	626	27	31	326	170	20	41	27	227	18	161
RTOR Reduction (vph)	0	0	16	0	0	127	0	0	25	0	0	134
Lane Group Flow (vph)	257	626	11	31	326	43	20	41	2	0	245	27
Heavy Vehicles (%)	8%	5%	26%	11%	5%	7%	20%	16%	0%	4%	20%	11%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases			2			6			4			3
Actuated Green, G (s)	15.4	34.6	34.6	1.8	21.5	21.5	5.5	5.5	5.5		14.3	14.3
Effective Green, g (s)	15.4	34.6	34.6	1.8	21.5	21.5	5.5	5.5	5.5		14.3	14.3
Actuated g/C Ratio	0.18	0.41	0.41	0.02	0.25	0.25	0.06	0.06	0.06		0.17	0.17
Clearance Time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Vehicle Extension (s)	0.2	3.5	3.5	0.2	3.5	3.5	0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	303	1404	523	67	872	383	92	101	104		291	245
v/s Ratio Prot	c0.15	c0.18		0.01	0.09		0.01	c0.03			c0.14	
v/s Ratio Perm			0.01			0.03			0.00			0.02
v/c Ratio	0.85	0.45	0.02	0.46	0.37	0.11	0.22	0.41	0.02		0.84	0.11
Uniform Delay, d1	33.5	18.1	14.9	41.0	26.1	24.3	37.6	38.0	37.1		34.1	29.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	18.6	0.3	0.0	1.8	0.3	0.2	0.4	1.0	0.0		18.6	0.1
Delay (s)	52.1	18.4	15.0	42.8	26.4	24.4	38.0	39.0	37.1		52.7	29.9
Level of Service	D	B	B	D	C	C	D	D	D		D	C
Approach Delay (s)		27.8			26.7			38.2			43.7	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			31.3			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			84.7			Sum of lost time (s)			28.5			
Intersection Capacity Utilization			60.1%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Croaker Road & Rt. 60/Richmond Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	114	504	60	130	674	303	112	92	41	247	73	167
Future Volume (vph)	114	504	60	130	674	303	112	92	41	247	73	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	1615	3433	3539	1599	1698	1787	1583		1815	1509
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	1615	3433	3539	1599	1698	1787	1583		1815	1509
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.95	0.95	0.95
Adj. Flow (vph)	124	548	65	141	733	329	123	101	45	260	77	176
RTOR Reduction (vph)	0	0	45	0	0	234	0	0	40	0	0	138
Lane Group Flow (vph)	124	548	20	141	733	95	123	101	5	0	337	38
Heavy Vehicles (%)	2%	2%	0%	2%	2%	1%	1%	1%	2%	1%	0%	7%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases			2			6			4			3
Actuated Green, G (s)	9.6	30.0	30.0	7.1	28.0	28.0	10.3	10.3	10.3		20.9	20.9
Effective Green, g (s)	9.6	30.0	30.0	7.1	28.0	28.0	10.3	10.3	10.3		20.9	20.9
Actuated g/C Ratio	0.10	0.31	0.31	0.07	0.29	0.29	0.11	0.11	0.11		0.22	0.22
Clearance Time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Vehicle Extension (s)	0.2	3.5	3.5	0.2	3.5	3.5	0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	175	1096	500	251	1023	462	180	190	168		391	325
v/s Ratio Prot	c0.07	0.15		0.04	c0.21		c0.07	0.06			c0.19	
v/s Ratio Perm			0.01			0.06			0.00			0.03
v/c Ratio	0.71	0.50	0.04	0.56	0.72	0.21	0.68	0.53	0.03		0.86	0.12
Uniform Delay, d1	42.2	27.3	23.3	43.3	30.8	26.0	41.7	41.0	38.8		36.6	30.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.2	0.4	0.0	1.7	2.5	0.3	8.2	1.4	0.0		16.9	0.1
Delay (s)	52.5	27.7	23.4	45.1	33.3	26.3	49.9	42.4	38.8		53.5	30.6
Level of Service	D	C	C	D	C	C	D	D	D		D	C
Approach Delay (s)		31.5			32.8			45.2			45.6	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			36.1			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			96.8			Sum of lost time (s)			28.5			
Intersection Capacity Utilization			66.6%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Croaker Road & Rt. 60/Richmond Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 		 	 			 			 	
Traffic Volume (vph)	239	581	31	36	307	160	33	47	42	203	21	145
Future Volume (vph)	239	581	31	36	307	160	33	47	42	203	21	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1671	3438	1282	3155	3438	1509	1429	1556	1615		1723	1455
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1671	3438	1282	3155	3438	1509	1429	1556	1615		1723	1455
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)	260	632	34	39	334	174	36	51	46	221	23	158
RTOR Reduction (vph)	0	0	21	0	0	132	0	0	43	0	0	131
Lane Group Flow (vph)	260	632	13	39	334	42	36	51	3	0	244	27
Heavy Vehicles (%)	8%	5%	26%	11%	5%	7%	20%	16%	0%	4%	20%	11%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases			2			6			4			3
Actuated Green, G (s)	15.4	32.4	32.4	2.8	20.3	20.3	5.7	5.7	5.7		14.3	14.3
Effective Green, g (s)	15.4	32.4	32.4	2.8	20.3	20.3	5.7	5.7	5.7		14.3	14.3
Actuated g/C Ratio	0.18	0.39	0.39	0.03	0.24	0.24	0.07	0.07	0.07		0.17	0.17
Clearance Time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Vehicle Extension (s)	0.2	3.5	3.5	0.2	3.5	3.5	0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	307	1330	496	105	833	365	97	105	109		294	248
v/s Ratio Prot	c0.16	c0.18		0.01	0.10		0.03	c0.03			c0.14	
v/s Ratio Perm			0.01			0.03			0.00			0.02
v/c Ratio	0.85	0.48	0.03	0.37	0.40	0.12	0.37	0.49	0.03		0.83	0.11
Uniform Delay, d1	33.0	19.3	15.9	39.6	26.6	24.7	37.3	37.6	36.4		33.5	29.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	18.3	0.3	0.0	0.8	0.4	0.2	0.9	1.3	0.0		16.6	0.1
Delay (s)	51.3	19.6	15.9	40.4	27.0	24.9	38.2	38.9	36.5		50.1	29.4
Level of Service	D	B	B	D	C	C	D	D	D		D	C
Approach Delay (s)		28.3			27.3			37.8			42.0	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			31.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			83.7				Sum of lost time (s)		28.5			
Intersection Capacity Utilization			62.3%				ICU Level of Service		B			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Croaker Road & Rt. 60/Richmond Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	544	65	140	729	327	121	98	44	267	79	180
Future Volume (vph)	123	544	65	140	729	327	121	98	44	267	79	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	7.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	1615	3433	3539	1599	1698	1787	1583		1815	1509
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	1615	3433	3539	1599	1698	1787	1583		1815	1509
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.95	0.95	0.95
Adj. Flow (vph)	134	591	71	152	792	355	132	107	48	281	83	189
RTOR Reduction (vph)	0	0	49	0	0	241	0	0	43	0	0	169
Lane Group Flow (vph)	134	591	22	152	792	114	132	107	5	0	364	20
Heavy Vehicles (%)	2%	2%	0%	2%	2%	1%	1%	1%	2%	1%	0%	7%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	custom
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases			2			6			4			4
Actuated Green, G (s)	10.2	32.0	32.0	7.5	29.8	29.8	10.8	10.8	10.8		23.2	10.8
Effective Green, g (s)	10.2	32.0	32.0	7.5	29.8	29.8	10.8	10.8	10.8		23.2	10.8
Actuated g/C Ratio	0.10	0.31	0.31	0.07	0.29	0.29	0.11	0.11	0.11		0.23	0.11
Clearance Time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	7.0
Vehicle Extension (s)	0.2	3.5	3.5	0.2	3.5	3.5	0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	177	1110	506	252	1033	467	179	189	167		412	159
v/s Ratio Prot	c0.08	0.17		0.04	c0.22		c0.08	0.06			c0.20	
v/s Ratio Perm			0.01			0.07			0.00			0.01
v/c Ratio	0.76	0.53	0.04	0.60	0.77	0.24	0.74	0.57	0.03		0.88	0.13
Uniform Delay, d1	44.7	28.8	24.4	45.8	32.9	27.5	44.2	43.4	40.9		38.1	41.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	15.0	0.6	0.0	2.8	3.6	0.3	12.7	2.3	0.0		19.1	0.1
Delay (s)	59.7	29.4	24.4	48.6	36.5	27.8	57.0	45.7	40.9		57.1	41.5
Level of Service	E	C	C	D	D	C	E	D	D		E	D
Approach Delay (s)		34.1			35.5			50.1			51.8	
Approach LOS		C			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			39.6				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			102.0				Sum of lost time (s)			28.5		
Intersection Capacity Utilization			70.1%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Croaker Road & Rt. 60/Richmond Road

09/24/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	251	599	31	36	312	160	33	47	42	203	21	149
Future Volume (vph)	251	599	31	36	312	160	33	47	42	203	21	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1687	3438	1282	3155	3438	1509	1429	1556	1615		1723	1455
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1687	3438	1282	3155	3438	1509	1429	1556	1615		1723	1455
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)	273	651	34	39	339	174	36	51	46	221	23	162
RTOR Reduction (vph)	0	0	21	0	0	132	0	0	43	0	0	134
Lane Group Flow (vph)	273	651	13	39	339	42	36	51	3	0	244	28
Heavy Vehicles (%)	7%	5%	26%	11%	5%	7%	20%	16%	0%	4%	20%	11%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases			2			6			4			3
Actuated Green, G (s)	15.4	32.5	32.5	2.8	20.4	20.4	5.7	5.7	5.7		14.4	14.4
Effective Green, g (s)	15.4	32.5	32.5	2.8	20.4	20.4	5.7	5.7	5.7		14.4	14.4
Actuated g/C Ratio	0.18	0.39	0.39	0.03	0.24	0.24	0.07	0.07	0.07		0.17	0.17
Clearance Time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Vehicle Extension (s)	0.2	3.5	3.5	0.2	3.5	3.5	0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	309	1331	496	105	835	366	97	105	109		295	249
v/s Ratio Prot	c0.16	c0.19		0.01	0.10		0.03	c0.03			c0.14	
v/s Ratio Perm			0.01			0.03			0.00			0.02
v/c Ratio	0.88	0.49	0.03	0.37	0.41	0.12	0.37	0.49	0.03		0.83	0.11
Uniform Delay, d1	33.4	19.4	15.9	39.7	26.7	24.7	37.4	37.7	36.5		33.5	29.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	23.8	0.3	0.0	0.8	0.4	0.2	0.9	1.3	0.0		16.3	0.1
Delay (s)	57.2	19.8	15.9	40.5	27.0	24.9	38.3	39.0	36.6		49.9	29.4
Level of Service	E	B	B	D	C	C	D	D	D		D	C
Approach Delay (s)		30.3			27.3			37.9			41.7	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			32.2									
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			83.9									
Intersection Capacity Utilization			62.9%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Croaker Road & Rt. 60/Richmond Road

09/25/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	555	83	162	748	327	132	107	58	267	94	192
Future Volume (vph)	130	555	83	162	748	327	132	107	58	267	94	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	1615	3433	3539	1599	1698	1787	1583		1819	1509
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	1615	3433	3539	1599	1698	1787	1583		1819	1509
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	141	603	90	176	813	355	143	116	63	281	99	202
RTOR Reduction (vph)	0	0	63	0	0	230	0	0	56	0	0	153
Lane Group Flow (vph)	141	603	27	176	813	125	143	116	7	0	380	49
Heavy Vehicles (%)	2%	2%	0%	2%	2%	1%	1%	1%	2%	1%	0%	7%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases			2			6			4			3
Actuated Green, G (s)	10.4	31.2	31.2	8.0	29.3	29.3	11.1	11.1	11.1		23.9	23.9
Effective Green, g (s)	10.4	31.2	31.2	8.0	29.3	29.3	11.1	11.1	11.1		23.9	23.9
Actuated g/C Ratio	0.10	0.30	0.30	0.08	0.29	0.29	0.11	0.11	0.11		0.23	0.23
Clearance Time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Vehicle Extension (s)	0.2	3.5	3.5	0.2	3.5	3.5	0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	179	1075	490	267	1009	456	183	193	171		423	351
v/s Ratio Prot	c0.08	0.17		0.05	c0.23		c0.08	0.06			c0.21	
v/s Ratio Perm			0.02			0.08			0.00			0.03
v/c Ratio	0.79	0.56	0.06	0.66	0.81	0.27	0.78	0.60	0.04		0.90	0.14
Uniform Delay, d1	45.1	30.0	25.3	46.0	34.1	28.5	44.6	43.7	41.0		38.2	31.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	18.7	0.7	0.1	4.4	4.9	0.4	17.9	3.6	0.0		20.7	0.1
Delay (s)	63.8	30.7	25.4	50.5	39.0	28.8	62.5	47.3	41.1		59.0	31.3
Level of Service	E	C	C	D	D	C	E	D	D		E	C
Approach Delay (s)		35.7			37.8			52.8			49.4	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.0			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			102.7			Sum of lost time (s)			28.5			
Intersection Capacity Utilization			71.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Croaker Road & Rt. 60/Richmond Road

09/24/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	251	599	31	36	312	160	33	47	42	203	21	149
Future Volume (vph)	251	599	31	36	312	160	33	47	42	203	21	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1687	3438	1282	3155	3438	1509	1429	1556	1615		1723	1455
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1687	3438	1282	3155	3438	1509	1429	1556	1615		1723	1455
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)	273	651	34	39	339	174	36	51	46	221	23	162
RTOR Reduction (vph)	0	0	20	0	0	131	0	0	43	0	0	134
Lane Group Flow (vph)	273	651	14	39	339	43	36	51	3	0	244	28
Heavy Vehicles (%)	7%	5%	26%	11%	5%	7%	20%	16%	0%	4%	20%	11%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases			2			6			4			3
Actuated Green, G (s)	16.7	35.0	35.0	2.7	21.5	21.5	5.6	5.6	5.6		15.0	15.0
Effective Green, g (s)	16.7	35.0	35.0	2.7	21.5	21.5	5.6	5.6	5.6		15.0	15.0
Actuated g/C Ratio	0.19	0.40	0.40	0.03	0.25	0.25	0.06	0.06	0.06		0.17	0.17
Clearance Time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Vehicle Extension (s)	0.2	3.5	3.5	0.2	3.5	3.5	0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	324	1386	516	98	851	373	92	100	104		297	251
v/s Ratio Prot	c0.16	c0.19		0.01	0.10		0.03	c0.03			c0.14	
v/s Ratio Perm			0.01			0.03			0.00			0.02
v/c Ratio	0.84	0.47	0.03	0.40	0.40	0.12	0.39	0.51	0.03		0.82	0.11
Uniform Delay, d1	33.8	19.1	15.6	41.3	27.3	25.3	39.0	39.3	38.1		34.6	30.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	17.1	0.3	0.0	1.0	0.4	0.2	1.0	1.8	0.0		15.8	0.1
Delay (s)	50.8	19.4	15.6	42.2	27.6	25.5	40.0	41.1	38.1		50.4	30.4
Level of Service	D	B	B	D	C	C	D	D	D		D	C
Approach Delay (s)		28.2			28.0			39.8			42.4	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			31.7				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			86.8				Sum of lost time (s)			28.5		
Intersection Capacity Utilization			62.9%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: Croaker Road & Rt. 60/Richmond Road

09/25/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	555	83	162	748	327	132	107	58	267	94	192
Future Volume (vph)	130	555	83	162	748	327	132	107	58	267	94	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.95	0.95	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	1615	3433	3539	1599	1698	1787	1583		1819	1509
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	1615	3433	3539	1599	1698	1787	1583		1819	1509
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	141	603	90	176	813	355	143	116	63	281	99	202
RTOR Reduction (vph)	0	0	62	0	0	233	0	0	56	0	0	153
Lane Group Flow (vph)	141	603	28	176	813	122	143	116	7	0	380	49
Heavy Vehicles (%)	2%	2%	0%	2%	2%	1%	1%	1%	2%	1%	0%	7%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases			2			6			4			3
Actuated Green, G (s)	10.2	31.6	31.6	8.1	30.0	30.0	11.0	11.0	11.0		24.0	24.0
Effective Green, g (s)	10.2	31.6	31.6	8.1	30.0	30.0	11.0	11.0	11.0		24.0	24.0
Actuated g/C Ratio	0.10	0.31	0.31	0.08	0.29	0.29	0.11	0.11	0.11		0.23	0.23
Clearance Time (s)	7.0	6.0	6.0	7.5	6.0	6.0	7.0	7.0	7.0		8.0	8.0
Vehicle Extension (s)	0.2	3.5	3.5	0.2	3.5	3.5	0.2	0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	174	1083	494	269	1028	464	180	190	168		423	350
v/s Ratio Prot	c0.08	0.17		0.05	c0.23		c0.08	0.06			c0.21	
v/s Ratio Perm			0.02			0.08			0.00			0.03
v/c Ratio	0.81	0.56	0.06	0.65	0.79	0.26	0.79	0.61	0.04		0.90	0.14
Uniform Delay, d1	45.6	29.9	25.3	46.2	33.7	28.1	45.0	44.1	41.4		38.4	31.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	22.9	0.7	0.1	4.3	4.3	0.4	19.7	4.0	0.0		20.7	0.1
Delay (s)	68.5	30.6	25.3	50.5	38.1	28.5	64.7	48.1	41.4		59.2	31.5
Level of Service	E	C	C	D	D	C	E	D	D		E	C
Approach Delay (s)		36.5			37.2			54.2			49.6	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.1		HCM 2000 Level of Service				D			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			103.2	Sum of lost time (s)				28.5				
Intersection Capacity Utilization			71.8%	ICU Level of Service				C				
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Int Delay, s/veh 0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑	↑	↑
Traffic Vol, veh/h	771	2	4	429	6	11
Future Vol, veh/h	771	2	4	429	6	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	0	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	61	61
Heavy Vehicles, %	7	5	0	7	17	0
Mvmt Flow	907	2	5	505	10	18

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	909
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	757
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	757
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	259	559	-	-	757	-
HCM Lane V/C Ratio	0.038	0.032	-	-	0.006	-
HCM Control Delay (s)	19.4	11.7	-	-	9.8	0
HCM Lane LOS	C	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-

Intersection

Int Delay, s/veh 0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑	↑	↑
Traffic Vol, veh/h	663	5	19	934	7	15
Future Vol, veh/h	663	5	19	934	7	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	0	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	93	93	69	69
Heavy Vehicles, %	1	40	5	3	29	7
Mvmt Flow	753	6	20	1004	10	22

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	759
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.2
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.25
Pot Cap-1 Maneuver	-	-	829
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	829
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	230	607	-	-	829	-
HCM Lane V/C Ratio	0.044	0.036	-	-	0.025	-
HCM Control Delay (s)	21.4	11.2	-	-	9.5	0.2
HCM Lane LOS	C	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗		↖↑	↘	↗
Traffic Vol, veh/h	839	2	4	481	6	12
Future Vol, veh/h	839	2	4	481	6	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	0	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	5	0	7	17	0
Mvmt Flow	912	2	4	523	7	13
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	914	0	1182	456
Stage 1	-	-	-	-	912	-
Stage 2	-	-	-	-	270	-
Critical Hdwy	-	-	4.1	-	7.14	6.9
Critical Hdwy Stg 1	-	-	-	-	6.14	-
Critical Hdwy Stg 2	-	-	-	-	6.14	-
Follow-up Hdwy	-	-	2.2	-	3.67	3.3
Pot Cap-1 Maneuver	-	-	754	-	162	557
Stage 1	-	-	-	-	318	-
Stage 2	-	-	-	-	708	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	754	-	161	557
Mov Cap-2 Maneuver	-	-	-	-	257	-
Stage 1	-	-	-	-	316	-
Stage 2	-	-	-	-	708	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		14.2	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	257	557	-	-	754	-
HCM Lane V/C Ratio	0.025	0.023	-	-	0.006	-
HCM Control Delay (s)	19.4	11.6	-	-	9.8	0
HCM Lane LOS	C	B	-	-	A	A
HCM 95th %tile O(veh)	0.1	0.1	-	-	0	-

Intersection

Int Delay, s/veh 0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑	↑	↑
Traffic Vol, veh/h	716	5	21	1009	8	16
Future Vol, veh/h	716	5	21	1009	8	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	-	-	0	0
Veh in Median Storage, #	0	-	-	0	1	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	40	5	3	29	7
Mvmt Flow	778	5	23	1097	9	17

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	783
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.2
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.25
Pot Cap-1 Maneuver	-	-	812
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	812
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	15
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	212	596	-	-	812	-
HCM Lane V/C Ratio	0.041	0.029	-	-	0.028	-
HCM Control Delay (s)	22.7	11.2	-	-	9.6	0.3
HCM Lane LOS	C	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-

HCM 6th TWSC
2: Oakland Drive/Crossover & Rt. 60

09/24/2018

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗					↑	↗		↗	
Traffic Vol, veh/h	0	839	7	0	0	0	0	21	42	0	13	0
Future Vol, veh/h	0	839	7	0	0	0	0	21	42	0	13	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	16983	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	7	5	0	7	2	0	17	0	2	2	2
Mvmt Flow	0	912	8	0	0	0	0	23	46	0	14	0
Major/Minor	Major1						Minor1			Minor2		
Conflicting Flow All	-	0	0				-	912	456	468	920	-
Stage 1	-	-	-				-	912	-	0	0	-
Stage 2	-	-	-				-	0	-	468	920	-
Critical Hdwy	-	-	-				-	6.84	6.9	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-				-	5.84	-	-	-	-
Critical Hdwy Stg 2	-	-	-				-	-	-	6.54	5.54	-
Follow-up Hdwy	-	-	-				-	4.17	3.3	3.52	4.02	-
Pot Cap-1 Maneuver	0	-	-				0	247	557	478	269	0
Stage 1	0	-	-				0	318	-	-	-	0
Stage 2	0	-	-				0	-	-	545	348	0
Platoon blocked, %		-	-									
Mov Cap-1 Maneuver	-	-	-				-	247	557	414	269	-
Mov Cap-2 Maneuver	-	-	-				-	316	-	414	269	-
Stage 1	-	-	-				-	318	-	-	-	-
Stage 2	-	-	-				-	-	-	464	348	-
Approach	EB						NB			SB		
HCM Control Delay, s	0						13.8			19.1		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	SBLn1							
Capacity (veh/h)	316	557	-	-	269							
HCM Lane V/C Ratio	0.072	0.082	-	-	0.053							
HCM Control Delay (s)	17.3	12	-	-	19.1							
HCM Lane LOS	C	B	-	-	C							
HCM 95th %tile Q(veh)	0.2	0.3	-	-	0.2							

HCM 6th TWSC
3: Crossover & WB Rt. 60

09/24/2018

Intersection

Int Delay, s/veh 0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	13	481	21	0
Future Vol, veh/h	0	0	13	481	21	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	0	7	17	2
Mvmt Flow	0	0	14	523	23	0

Major/Minor	Major2	Minor1
Conflicting Flow All	0	0 290 -
Stage 1	-	- 0 -
Stage 2	-	- 290 -
Critical Hdwy	4.1	- 7.14 -
Critical Hdwy Stg 1	-	- - -
Critical Hdwy Stg 2	-	- 6.14 -
Follow-up Hdwy	2.2	- 3.67 -
Pot Cap-1 Maneuver	-	- 637 0
Stage 1	-	- - 0
Stage 2	-	- 691 0
Platoon blocked, %		-
Mov Cap-1 Maneuver	-	- 637 -
Mov Cap-2 Maneuver	-	- 637 -
Stage 1	-	- - -
Stage 2	-	- 691 -

Approach	WB	NB
HCM Control Delay, s		10.9
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBL	WBT
Capacity (veh/h)	637	-	-
HCM Lane V/C Ratio	0.036	-	-
HCM Control Delay (s)	10.9	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-

HCM 6th TWSC
2: Oakland Drive/Crossover & Rt. 60

09/25/2018

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑					↑	↑		↑	
Traffic Vol, veh/h	0	734	20	0	0	0	0	17	34	0	52	0
Future Vol, veh/h	0	734	20	0	0	0	0	17	34	0	52	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	16983	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	93	93	92	69	92	92	92	92	92
Heavy Vehicles, %	2	1	40	5	3	2	2	29	7	5	5	2
Mvmt Flow	0	798	22	0	0	0	0	18	37	0	57	0
Major/Minor	Major1						Minor1			Minor2		
Conflicting Flow All	-	0	0				-	798	399	408	820	-
Stage 1	-	-	-				-	798	-	0	0	-
Stage 2	-	-	-				-	0	-	408	820	-
Critical Hdwy	-	-	-				-	7.08	7.04	7.6	6.6	-
Critical Hdwy Stg 1	-	-	-				-	6.08	-	-	-	-
Critical Hdwy Stg 2	-	-	-				-	-	-	6.6	5.6	-
Follow-up Hdwy	-	-	-				-	4.29	3.37	3.55	4.05	-
Pot Cap-1 Maneuver	0	-	-				0	271	587	521	303	0
Stage 1	0	-	-				0	338	-	-	-	0
Stage 2	0	-	-				0	-	-	583	380	0
Platoon blocked, %		-	-									
Mov Cap-1 Maneuver	-	-	-				-	271	587	467	303	-
Mov Cap-2 Maneuver	-	-	-				-	328	-	467	303	-
Stage 1	-	-	-				-	338	-	-	-	-
Stage 2	-	-	-				-	-	-	516	380	-
Approach	EB						NB			SB		
HCM Control Delay, s	0						13.2			19.6		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	SBLn1							
Capacity (veh/h)	328	587	-	-	303							
HCM Lane V/C Ratio	0.056	0.063	-	-	0.187							
HCM Control Delay (s)	16.6	11.5	-	-	19.6							
HCM Lane LOS	C	B	-	-	C							
HCM 95th %tile Q(veh)	0.2	0.2	-	-	0.7							

HCM 6th TWSC
3: Crossover & WB Rt. 60

09/25/2018

Intersection

Int Delay, s/veh 0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	52	1020	17	0
Future Vol, veh/h	0	0	52	1020	17	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	40	5	3	29	7
Mvmt Flow	0	0	57	1109	18	0

Major/Minor	Major2	Minor1
Conflicting Flow All	0	0 669 -
Stage 1	-	- 0 -
Stage 2	-	- 669 -
Critical Hdwy	4.2	- 7.38 -
Critical Hdwy Stg 1	-	- - -
Critical Hdwy Stg 2	-	- 6.38 -
Follow-up Hdwy	2.25	- 3.79 -
Pot Cap-1 Maneuver	-	- 336 0
Stage 1	-	- - 0
Stage 2	-	- 404 0
Platoon blocked, %		-
Mov Cap-1 Maneuver	-	- 336 -
Mov Cap-2 Maneuver	-	- 336 -
Stage 1	-	- - -
Stage 2	-	- 404 -

Approach	WB	NB
HCM Control Delay, s		16.3
HCM LOS		C

Minor Lane/Major Mvmt	NBLn1	WBL	WBT
Capacity (veh/h)	336	-	-
HCM Lane V/C Ratio	0.055	-	-
HCM Control Delay (s)	16.3	-	-
HCM Lane LOS	C	-	-
HCM 95th %tile Q(veh)	0.2	-	-

HCM 6th TWSC
2: Oakland Drive/Crossover & Rt. 60

09/24/2018

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗					↑	↗		↗	
Traffic Vol, veh/h	0	839	7	0	0	0	0	21	42	0	13	0
Future Vol, veh/h	0	839	7	0	0	0	0	21	42	0	13	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	16983	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	7	5	0	7	2	0	17	0	2	2	2
Mvmt Flow	0	912	8	0	0	0	0	23	46	0	14	0
Major/Minor	Major1						Minor1			Minor2		
Conflicting Flow All	-	0	0				-	912	456	468	920	-
Stage 1	-	-	-				-	912	-	0	0	-
Stage 2	-	-	-				-	0	-	468	920	-
Critical Hdwy	-	-	-				-	6.84	6.9	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-				-	5.84	-	-	-	-
Critical Hdwy Stg 2	-	-	-				-	-	-	6.54	5.54	-
Follow-up Hdwy	-	-	-				-	4.17	3.3	3.52	4.02	-
Pot Cap-1 Maneuver	0	-	-				0	247	557	478	269	0
Stage 1	0	-	-				0	318	-	-	-	0
Stage 2	0	-	-				0	-	-	545	348	0
Platoon blocked, %		-	-									
Mov Cap-1 Maneuver	-	-	-				-	247	557	414	269	-
Mov Cap-2 Maneuver	-	-	-				-	316	-	414	269	-
Stage 1	-	-	-				-	318	-	-	-	-
Stage 2	-	-	-				-	-	-	464	348	-
Approach	EB						NB			SB		
HCM Control Delay, s	0						13.8			19.1		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	SBLn1							
Capacity (veh/h)	316	557	-	-	269							
HCM Lane V/C Ratio	0.072	0.082	-	-	0.053							
HCM Control Delay (s)	17.3	12	-	-	19.1							
HCM Lane LOS	C	B	-	-	C							
HCM 95th %tile Q(veh)	0.2	0.3	-	-	0.2							

HCM 6th TWSC

3: Crossover & WB Rt. 60

09/24/2018

Intersection

Int Delay, s/veh 0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	13	481	21	0
Future Vol, veh/h	0	0	13	481	21	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	0	7	17	2
Mvmt Flow	0	0	14	523	23	0

Major/Minor	Major2	Minor1
Conflicting Flow All	0	0 290 -
Stage 1	-	- 0 -
Stage 2	-	- 290 -
Critical Hdwy	4.1	- 7.14 -
Critical Hdwy Stg 1	-	- - -
Critical Hdwy Stg 2	-	- 6.14 -
Follow-up Hdwy	2.2	- 3.67 -
Pot Cap-1 Maneuver	-	- 637 0
Stage 1	-	- - 0
Stage 2	-	- 691 0
Platoon blocked, %		-
Mov Cap-1 Maneuver	-	- 637 -
Mov Cap-2 Maneuver	-	- 637 -
Stage 1	-	- - -
Stage 2	-	- 691 -

Approach	WB	NB
HCM Control Delay, s		10.9
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBL	WBT
Capacity (veh/h)	637	-	-
HCM Lane V/C Ratio	0.036	-	-
HCM Control Delay (s)	10.9	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-

HCM 6th TWSC
2: Oakland Drive/Crossover & Rt. 60

09/25/2018

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗					↑	↗		↗	
Traffic Vol, veh/h	0	734	20	0	0	0	0	17	34	0	52	0
Future Vol, veh/h	0	734	20	0	0	0	0	17	34	0	52	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	16983	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	93	93	92	69	92	92	92	92	92
Heavy Vehicles, %	2	1	40	5	3	2	2	29	7	5	5	2
Mvmt Flow	0	798	22	0	0	0	0	18	37	0	57	0
Major/Minor	Major1						Minor1			Minor2		
Conflicting Flow All	-	0	0				-	798	399	408	820	-
Stage 1	-	-	-				-	798	-	0	0	-
Stage 2	-	-	-				-	0	-	408	820	-
Critical Hdwy	-	-	-				-	7.08	7.04	7.6	6.6	-
Critical Hdwy Stg 1	-	-	-				-	6.08	-	-	-	-
Critical Hdwy Stg 2	-	-	-				-	-	-	6.6	5.6	-
Follow-up Hdwy	-	-	-				-	4.29	3.37	3.55	4.05	-
Pot Cap-1 Maneuver	0	-	-				0	271	587	521	303	0
Stage 1	0	-	-				0	338	-	-	-	0
Stage 2	0	-	-				0	-	-	583	380	0
Platoon blocked, %		-	-									
Mov Cap-1 Maneuver	-	-	-				-	271	587	467	303	-
Mov Cap-2 Maneuver	-	-	-				-	328	-	467	303	-
Stage 1	-	-	-				-	338	-	-	-	-
Stage 2	-	-	-				-	-	-	516	380	-
Approach	EB						NB			SB		
HCM Control Delay, s	0						13.2			19.6		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1		NBLn2	EBT	EBR	SBLn1						
Capacity (veh/h)	328		587	-	-	303						
HCM Lane V/C Ratio	0.056		0.063	-	-	0.187						
HCM Control Delay (s)	16.6		11.5	-	-	19.6						
HCM Lane LOS	C		B	-	-	C						
HCM 95th %tile Q(veh)	0.2		0.2	-	-	0.7						

HCM 6th TWSC
3: Crossover & WB Rt. 60

09/25/2018

Intersection

Int Delay, s/veh 0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	52	1020	17	0
Future Vol, veh/h	0	0	52	1020	17	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	40	5	3	29	7
Mvmt Flow	0	0	57	1109	18	0

Major/Minor	Major2	Minor1
Conflicting Flow All	0	0 669 -
Stage 1	-	- 0 -
Stage 2	-	- 669 -
Critical Hdwy	4.2	- 7.38 -
Critical Hdwy Stg 1	-	- - -
Critical Hdwy Stg 2	-	- 6.38 -
Follow-up Hdwy	2.25	- 3.79 -
Pot Cap-1 Maneuver	-	- 336 0
Stage 1	-	- - 0
Stage 2	-	- 404 0
Platoon blocked, %		-
Mov Cap-1 Maneuver	-	- 336 -
Mov Cap-2 Maneuver	-	- 336 -
Stage 1	-	- - -
Stage 2	-	- 404 -

Approach	WB	NB
HCM Control Delay, s		16.3
HCM LOS		C

Minor Lane/Major Mvmt	NBLn1	WBL	WBT
Capacity (veh/h)	336	-	-
HCM Lane V/C Ratio	0.055	-	-
HCM Control Delay (s)	16.3	-	-
HCM Lane LOS	C	-	-
HCM 95th %tile Q(veh)	0.2	-	-

Queues

1: Croaker Road & Rt. 60/Richmond Road

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	257	626	27	31	326	170	20	41	27	245	161
v/c Ratio	0.79	0.41	0.04	0.15	0.45	0.37	0.15	0.28	0.09	0.78	0.40
Control Delay	52.3	20.0	0.1	41.0	31.3	6.6	40.1	42.6	0.6	48.9	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.3	20.0	0.1	41.0	31.3	6.6	40.1	42.6	0.6	48.9	7.9
Queue Length 50th (ft)	123	101	0	7	76	0	9	20	0	117	0
Queue Length 95th (ft)	#286	208	0	23	127	40	29	49	0	189	36
Internal Link Dist (ft)	1267			1429			615			808	
Turn Bay Length (ft)	200		10	200		200	165		150		200
Base Capacity (vph)	327	1616	700	598	1528	773	280	305	457	519	553
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.39	0.04	0.05	0.21	0.22	0.07	0.13	0.06	0.47	0.29

Intersection Summary

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

Queue shown is maximum after two cycles.

Queues

1: Croaker Road & Rt. 60/Richmond Road

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	124	548	65	141	733	329	123	101	45	337	176
v/c Ratio	0.71	0.50	0.10	0.57	0.72	0.47	0.69	0.53	0.14	0.87	0.38
Control Delay	67.2	29.8	0.3	55.9	36.7	5.8	64.8	55.3	0.9	61.9	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.2	29.8	0.3	55.9	36.7	5.8	64.8	55.3	0.9	61.9	8.5
Queue Length 50th (ft)	78	147	0	45	219	0	82	66	0	205	0
Queue Length 95th (ft)	150	220	0	85	323	66	157	132	0	#422	59
Internal Link Dist (ft)	1267			1429			615			808	
Turn Bay Length (ft)	200		10	200		200	165		150		200
Base Capacity (vph)	279	1314	716	523	1264	782	267	281	396	439	498
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.42	0.09	0.27	0.58	0.42	0.46	0.36	0.11	0.77	0.35

Intersection Summary

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

Queue shown is maximum after two cycles.

Queues

1: Croaker Road & Rt. 60/Richmond Road

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	260	632	34	39	334	174	36	51	46	244	158
v/c Ratio	0.80	0.45	0.05	0.19	0.46	0.37	0.26	0.34	0.15	0.78	0.40
Control Delay	53.7	22.2	0.2	41.8	31.5	6.9	42.8	44.4	1.0	49.8	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.7	22.2	0.2	41.8	31.5	6.9	42.8	44.4	1.0	49.8	7.7
Queue Length 50th (ft)	125	137	0	9	78	0	17	25	0	117	0
Queue Length 95th (ft)	#321	227	0	28	136	47	54	70	0	214	45
Internal Link Dist (ft)	1267			1429			615			808	
Turn Bay Length (ft)	200		10	200		200	165		150		200
Base Capacity (vph)	326	1583	690	595	1521	770	278	303	456	515	552
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.40	0.05	0.07	0.22	0.23	0.13	0.17	0.10	0.47	0.29

Intersection Summary

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

Queue shown is maximum after two cycles.

Queues

1: Croaker Road & Rt. 60/Richmond Road

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	134	591	71	152	792	355	132	107	48	364	189
v/c Ratio	0.76	0.53	0.11	0.61	0.77	0.50	0.74	0.57	0.15	0.89	0.58
Control Delay	72.9	31.1	0.4	58.7	39.5	6.7	70.2	57.6	1.0	64.7	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.9	31.1	0.4	58.7	39.5	6.7	70.2	57.6	1.0	64.7	14.2
Queue Length 50th (ft)	89	165	0	52	248	7	92	73	0	242	0
Queue Length 95th (ft)	162	241	0	90	353	79	168	138	0	#470	67
Internal Link Dist (ft)	1267			1429			615			808	
Turn Bay Length (ft)	200		10	200		200	165		150		200
Base Capacity (vph)	262	1250	690	492	1191	764	252	265	384	413	384
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.47	0.10	0.31	0.66	0.46	0.52	0.40	0.13	0.88	0.49

Intersection Summary

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

Queue shown is maximum after two cycles.

Queues

1: Croaker Road & Rt. 60/Richmond Road

09/24/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	273	651	34	39	339	174	36	51	46	244	162
v/c Ratio	0.83	0.46	0.05	0.19	0.46	0.37	0.26	0.34	0.15	0.78	0.41
Control Delay	57.3	22.4	0.2	42.0	31.5	6.8	43.0	44.6	1.0	49.7	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.3	22.4	0.2	42.0	31.5	6.8	43.0	44.6	1.0	49.7	8.1
Queue Length 50th (ft)	132	143	0	9	80	0	17	25	0	117	0
Queue Length 95th (ft)	#341	234	0	28	138	46	54	71	0	215	48
Internal Link Dist (ft)		943			1429			615		808	
Turn Bay Length (ft)	400		10	200		200	165		150		200
Base Capacity (vph)	328	1580	689	594	1518	769	278	303	455	514	551
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.41	0.05	0.07	0.22	0.23	0.13	0.17	0.10	0.47	0.29

Intersection Summary

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

Queue shown is maximum after two cycles.

Queues

1: Croaker Road & Rt. 60/Richmond Road

09/25/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	141	603	90	176	813	355	143	116	63	380	202
v/c Ratio	0.79	0.57	0.15	0.66	0.81	0.52	0.79	0.61	0.19	0.90	0.40
Control Delay	77.9	33.9	0.5	60.7	43.1	8.4	76.4	60.7	1.3	65.5	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.9	33.9	0.5	60.7	43.1	8.4	76.4	60.7	1.3	65.5	7.6
Queue Length 50th (ft)	99	186	0	63	282	17	105	84	0	260	1
Queue Length 95th (ft)	#193	262	0	102	377	98	#208	151	0	#422	60
Internal Link Dist (ft)		654			1429			615		808	
Turn Bay Length (ft)	300		10	200		200	165		150		200
Base Capacity (vph)	228	1173	659	374	1104	720	227	238	363	522	576
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.51	0.14	0.47	0.74	0.49	0.63	0.49	0.17	0.73	0.35

Intersection Summary

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

Queue shown is maximum after two cycles.

Queues

1: Croaker Road & Rt. 60/Richmond Road

09/24/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	273	651	34	39	339	174	36	51	46	244	162
v/c Ratio	0.80	0.45	0.05	0.19	0.47	0.34	0.27	0.34	0.12	0.78	0.36
Control Delay	51.5	21.6	0.2	46.7	35.0	2.6	48.0	49.5	0.7	52.0	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.5	21.6	0.2	46.7	35.0	2.6	48.0	49.5	0.7	52.0	3.2
Queue Length 50th (ft)	133	145	0	9	83	0	18	26	0	120	0
Queue Length 95th (ft)	269	239	0	32	166	10	63	81	0	247	11
Internal Link Dist (ft)		943			1429			615		808	
Turn Bay Length (ft)	400		10	200		200	165		150		200
Base Capacity (vph)	658	2013	827	225	939	594	167	182	402	605	661
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.32	0.04	0.17	0.36	0.29	0.22	0.28	0.11	0.40	0.25

Intersection Summary

Queues

1: Croaker Road & Rt. 60/Richmond Road

09/25/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	141	603	90	176	813	355	143	116	63	380	202
v/c Ratio	0.82	0.56	0.15	0.66	0.80	0.51	0.80	0.61	0.19	0.90	0.40
Control Delay	82.0	33.7	0.5	61.1	41.9	7.7	78.4	61.7	1.3	65.8	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.0	33.7	0.5	61.1	41.9	7.7	78.4	61.7	1.3	65.8	7.6
Queue Length 50th (ft)	101	188	0	65	285	14	107	85	0	266	1
Queue Length 95th (ft)	#205	260	0	102	370	91	#214	152	0	#422	60
Internal Link Dist (ft)		654			1429			615		808	
Turn Bay Length (ft)	300		10	200		200	165		150		200
Base Capacity (vph)	209	1194	667	368	1151	741	217	229	355	520	574
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.51	0.13	0.48	0.71	0.48	0.66	0.51	0.18	0.73	0.35

Intersection Summary

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

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	LT	R
Maximum Queue (ft)	229	109	112	25	5	44	111	67	66	8	52	13
Average Queue (ft)	144	69	66	6	1	20	75	43	36	2	27	7
95th Queue (ft)	254	119	126	27	9	55	120	80	70	14	67	20
Link Distance (ft)		1278	1278				1450	1450			618	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200			10	200	200			200	165		150
Storage Blk Time (%)	7		22	1								
Queuing Penalty (veh)	18		5	1								

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	174	58
Average Queue (ft)	120	31
95th Queue (ft)	186	65
Link Distance (ft)	797	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)	2	
Queuing Penalty (veh)	3	

Intersection: 2: Oakland Drive & Rt. 60

Movement	NB	NB
Directions Served	L	R
Maximum Queue (ft)	19	19
Average Queue (ft)	4	7
95th Queue (ft)	21	22
Link Distance (ft)	1186	1186
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 27

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	LT	R
Maximum Queue (ft)	162	153	151	52	59	127	257	237	147	196	240	41
Average Queue (ft)	72	91	87	20	16	64	146	120	61	53	125	15
95th Queue (ft)	126	140	141	46	44	111	222	203	109	157	208	34
Link Distance (ft)		1278	1278				1450	1450			618	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200			10	200	200			200	165		150
Storage Blk Time (%)	0		37	4			2	0	0	0	9	
Queuing Penalty (veh)	0		22	9			2	1	0	0	9	

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	842	831
Average Queue (ft)	733	541
95th Queue (ft)	986	1145
Link Distance (ft)	797	797
Upstream Blk Time (%)	60	42
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Oakland Drive & Rt. 60

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	56	36	31
Average Queue (ft)	11	4	9
95th Queue (ft)	40	21	26
Link Distance (ft)	1278	1186	1186
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 45

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	LT	R	LT
Maximum Queue (ft)	221	152	150	42	57	94	70	68	12	84	27	302
Average Queue (ft)	177	102	98	18	27	69	41	48	3	50	14	197
95th Queue (ft)	273	213	159	57	60	104	72	81	14	93	33	434
Link Distance (ft)		1278	1278			1450	1450			618		797
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200			10	200			200	165		150	
Storage Blk Time (%)	19	0	37	2								16
Queuing Penalty (veh)	55	1	12	5								23

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	SB
Directions Served	R
Maximum Queue (ft)	118
Average Queue (ft)	66
95th Queue (ft)	248
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Oakland Drive & Rt. 60

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	5	26	20
Average Queue (ft)	2	9	9
95th Queue (ft)	14	44	25
Link Distance (ft)	1278	1186	1186
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 95

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	LT	R
Maximum Queue (ft)	158	190	208	88	110	150	233	204	178	197	251	158
Average Queue (ft)	76	108	105	25	20	71	149	122	69	60	139	26
95th Queue (ft)	136	172	175	62	65	122	216	191	131	172	225	90
Link Distance (ft)		1278	1278				1450	1450			618	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200			10	200	200			200	165		150
Storage Blk Time (%)	0	0	42	4		0	1	0	0	0	12	
Queuing Penalty (veh)	0	0	27	12		0	2	1	1	0	12	

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	835	828
Average Queue (ft)	782	701
95th Queue (ft)	950	1146
Link Distance (ft)	797	797
Upstream Blk Time (%)	81	58
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Oakland Drive & Rt. 60

Movement	WB	WB	NB	NB
Directions Served	LT	T	L	R
Maximum Queue (ft)	86	43	47	44
Average Queue (ft)	16	3	8	10
95th Queue (ft)	59	29	32	31
Link Distance (ft)	1278	1278	1186	1186
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 55

Queuing and Blocking Report

Baseline

09/24/2018

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	LT	R
Maximum Queue (ft)	313	122	112	48	3	58	130	103	65	36	112	24
Average Queue (ft)	232	83	87	13	1	28	89	53	42	8	61	12
95th Queue (ft)	409	132	122	47	5	63	153	118	75	51	119	29
Link Distance (ft)		948	948				1450	1450			618	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400			10	200	200			200	165		150
Storage Blk Time (%)	2		32	1			0				1	
Queuing Penalty (veh)	5		10	4			0				1	

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	241	105
Average Queue (ft)	169	54
95th Queue (ft)	290	206
Link Distance (ft)	797	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)	7	
Queuing Penalty (veh)	11	

Intersection: 2: Oakland Drive/Crossover & Rt. 60

Movement	NB	NB	SB
Directions Served	T	R	LT
Maximum Queue (ft)	27	17	30
Average Queue (ft)	11	12	11
95th Queue (ft)	32	24	34
Link Distance (ft)	1212	1212	24
Upstream Blk Time (%)			2
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report

Baseline

09/24/2018

Intersection: 3: Crossover & WB Rt. 60

Movement	NB
Directions Served	L
Maximum Queue (ft)	34
Average Queue (ft)	14
95th Queue (ft)	41
Link Distance (ft)	24
Upstream Blk Time (%)	2
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Rt. 60 & WB Rt. 60

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 30

Queuing and Blocking Report

Baseline

09/25/2018

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	LT	R
Maximum Queue (ft)	214	174	184	91	126	153	249	220	154	219	283	162
Average Queue (ft)	92	108	105	30	34	85	155	130	72	60	141	32
95th Queue (ft)	170	165	161	64	89	138	226	204	123	171	235	109
Link Distance (ft)		659	659				1450	1450			618	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300			10	200	200			200	165		150
Storage Blk Time (%)			43	7			1	0	0	0	11	0
Queuing Penalty (veh)			36	18			2	1	0	0	14	0

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	846	365
Average Queue (ft)	793	332
95th Queue (ft)	948	499
Link Distance (ft)	797	
Upstream Blk Time (%)	84	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		200
Storage Blk Time (%)	93	1
Queuing Penalty (veh)	179	2

Intersection: 2: Oakland Drive/Crossover & Rt. 60

Movement	EB	EB	NB	NB	SB
Directions Served	T	T	T	R	LT
Maximum Queue (ft)	15	10	74	44	60
Average Queue (ft)	0	0	17	14	27
95th Queue (ft)	8	7	50	32	51
Link Distance (ft)	1052	1052	1212	1212	24
Upstream Blk Time (%)					8
Queuing Penalty (veh)					4
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Queuing and Blocking Report

Baseline

09/25/2018

Intersection: 3: Crossover & WB Rt. 60

Movement	WB	NB
Directions Served	L	L
Maximum Queue (ft)	43	71
Average Queue (ft)	8	20
95th Queue (ft)	33	57
Link Distance (ft)		24
Upstream Blk Time (%)		4
Queuing Penalty (veh)		1
Storage Bay Dist (ft)	100	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Rt. 60 & WB Rt. 60

Movement	EB
Directions Served	T
Maximum Queue (ft)	11
Average Queue (ft)	0
95th Queue (ft)	8
Link Distance (ft)	256
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 258

Queuing and Blocking Report

Baseline

09/25/2018

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	LT	R
Maximum Queue (ft)	312	228	200	44	14	57	104	75	71	5	104	23
Average Queue (ft)	233	119	95	11	3	32	80	42	44	1	51	13
95th Queue (ft)	413	349	258	42	15	69	131	92	78	10	116	29
Link Distance (ft)		948	948				1450	1450			618	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400			10	200	200			200	165		150
Storage Blk Time (%)	7	0	28	1							0	
Queuing Penalty (veh)	21	0	9	4							0	

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	178	41
Average Queue (ft)	136	24
95th Queue (ft)	212	47
Link Distance (ft)	797	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)	1	
Queuing Penalty (veh)	2	

Intersection: 2: Oakland Drive/Crossover & Rt. 60

Movement	NB	NB	SB
Directions Served	T	R	LT
Maximum Queue (ft)	30	25	24
Average Queue (ft)	9	14	9
95th Queue (ft)	31	33	32
Link Distance (ft)	1212	1212	24
Upstream Blk Time (%)			3
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report

Baseline

09/25/2018

Intersection: 3: Crossover & WB Rt. 60

Movement	NB
Directions Served	L
Maximum Queue (ft)	33
Average Queue (ft)	10
95th Queue (ft)	34
Link Distance (ft)	24
Upstream Blk Time (%)	2
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 10: Rt. 60 & WB Rt. 60

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 36

Queuing and Blocking Report

Baseline

09/25/2018

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	LT	R
Maximum Queue (ft)	190	181	192	114	111	129	249	239	185	240	322	196
Average Queue (ft)	85	105	102	30	26	74	155	133	74	68	149	35
95th Queue (ft)	156	163	165	73	68	119	227	212	133	185	255	121
Link Distance (ft)		659	659				1450	1450			618	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300			10	200	200			200	165		150
Storage Blk Time (%)			42	6			2	1	0	0	14	
Queuing Penalty (veh)			35	17			3	3	0	1	17	

Intersection: 1: Croaker Road & Rt. 60/Richmond Road

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	849	365
Average Queue (ft)	784	328
95th Queue (ft)	969	499
Link Distance (ft)	797	
Upstream Blk Time (%)	82	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		200
Storage Blk Time (%)	91	0
Queuing Penalty (veh)	175	0

Intersection: 2: Oakland Drive/Crossover & Rt. 60

Movement	EB	EB	NB	NB	SB
Directions Served	T	T	T	R	LT
Maximum Queue (ft)	15	4	60	45	48
Average Queue (ft)	1	0	14	15	24
95th Queue (ft)	8	3	42	34	46
Link Distance (ft)	1052	1052	1212	1212	24
Upstream Blk Time (%)					6
Queuing Penalty (veh)					3
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Queuing and Blocking Report

Baseline

09/25/2018

Intersection: 3: Crossover & WB Rt. 60

Movement	WB	NB
Directions Served	L	L
Maximum Queue (ft)	48	68
Average Queue (ft)	6	17
95th Queue (ft)	28	50
Link Distance (ft)		24
Upstream Blk Time (%)		3
Queuing Penalty (veh)		1
Storage Bay Dist (ft)	100	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Rt. 60 & WB Rt. 60

Movement	B11
Directions Served	T
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	659
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 256
