

Pete O. Kotarides

Subject: FW: Rio Road By-right Analysis
Attachments: image001.png; ATT00001.htm; image002.gif; ATT00002.htm; image003.gif; ATT00003.htm; image004.gif; ATT00004.htm; Build AM - No Improvements.syn; ATT00005.htm; Build PM - No Improvements.syn; ATT00006.htm; Synchro Reports (By-right).pdf; ATT00007.htm; Rio Road Multi-Family - By-Right Analysis Tables.pdf; ATT00008.htm

From: Mike Bailey <mbailey@rameykemp.com>

Date: January 21, 2020 at 4:24:32 PM EST

To: "Adam.Moore@vdot.virginia.gov" <Adam.Moore@vdot.virginia.gov>, "kmcdermott@albemarle.org" <kmcdermott@albemarle.org>

Cc: Ryan Hambleton <ryanh@kotarides.com>, Cameron Langille <blangille@albemarle.org>

Subject: Rio Road By-right Analysis

Kevin / Adam,

Attached, please find the by-right analysis we discussed at today's meeting. Please note the following:

- Trip generation is for 162 apartments (low-rise)
- Tables are numbered to match the tables in the TIA
- We used the "Build – No Improvements" Synchro files and only changed the volumes (same cycle lengths, splits, etc.)
- The reported queues are SimTraffic max queues

Please let me know if you have any questions or concerns.

Thanks,
Mike

Michael Bailey, P.E., PTOE
Transportation Engineer

www.rameykemp.com

Table 5
Level-of-Service Summary for Rio Road at John Warner Parkway / CATEC Driveway

CONDITION	LANE GROUP	Storage Length (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)
Existing (2018) Traffic Conditions	EBL	200	F	114.2	47	D (50.2 sec)	F	114.4	276	D (52.3 sec)
	EBT/R	300	D	40.3	314		D	52.6	782	
	WBL	-	F	84.0	466		F	83.6	654	
	WBT	-	B	13.0	310		B	12.5	330	
	WBR	500	A	7.1	19		A	7.3	29	
	NBL/T	75	F	84.3	124		E	78.6	124	
	NBR	-	E	67.3	190		E	64.3	180	
	SBL/T	-	F	113.6	23		F	103.6	30	
	SBR	125	F	98.5	6		F	101.5	11	
No-Build (2023) Traffic Conditions	EBL	200	F	114.4	100	D (53.7 sec)	F	115.0	299	E (59.9 sec)
	EBT/R	300	D	47.2	471		E	76.8	1,289	
	WBL	-	F	83.4	581		F	83.9	803	
	WBT	-	B	15.7	481		B	14.4	455	
	WBR	500	A	7.2	24		A	7.4	32	
	NBL/T	75	F	89.4	124		E	79.3	124	
	NBR	-	E	74.4	213		E	61.5	191	
	SBL/T	-	F	113.6	22		F	104.0	35	
	SBR	125	F	98.5	6		F	100.4	13	
Build (2023) Traffic Conditions <i>By-Right</i>	EBL	200	F	114.4	169	E (55.8 sec)	F	115.0	299	E (62.6 sec)
	EBT/R	300	D	48.0	435		F	84.5	1,331	
	WBL	-	F	83.3	545		F	84.6	818	
	WBT	-	B	15.7	446		B	14.4	538	
	WBR	500	A	7.2	23		A	7.4	30	
	NBL/T	75	F	98.4	124		E	80.0	124	
	NBR	-	E	79.0	220		E	60.2	200	
	SBL/T	-	F	113.6	24		F	104.0	36	
	SBR	125	F	98.5	4		F	100.4	8	
Build (2023) Traffic Conditions <i>With Median Acceleration Lane</i>	EBL	200	F	114.4	233	E (57.1 sec)	F	115.0	254	E (64.4 sec)
	EBT/R	300	D	48.5	424		F	89.7	1,341	
	WBL	-	F	83.3	595		F	85.2	816	
	WBT	-	B	15.7	488		B	14.5	536	
	WBR	500	A	7.2	26		A	7.4	33	
	NBL/T	-	F	104.8	179		F	80.5	164	
	NBR	-	F	81.8	178		E	59.5	183	
	SBL/T	-	F	113.6	13		F	104.2	22	
	SBR	125	F	98.5	2		F	99.5	5	

Table 6
Level-of-Service Summary for Rio Road at Dunlora Drive

CONDITION	LANE GROUP	Storage Length (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay) ³	Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay) ³
Existing (2018) Conditions	WBL ¹	-	E	45.1	107	N/A	D	34.1	58	N/A
	WBR ¹	200	B	14.6	106		B	13.5	66	
	NBT/R	-	-	-	-		-	-	-	
	SBL ²	50	A	9.3	65		A	9.4	92	
	SBT	-	-	-	-		-	-	-	
No-Build (2023) Conditions	WBL ¹	-	F	120.1	287	N/A	F	58.8	78	N/A
	WBR ¹	200	C	16.9	210		C	15.0	84	
	NBT/R	-	-	-	-		-	-	-	
	SBL ²	50	A	9.8	80		A	10.0	98	
	SBT	-	-	-	-		-	-	-	
Build (2023) Conditions <i>By-Right</i>	WBL ¹	-	F	147.4	460	N/A	F	67.8	81	N/A
	WBR ¹	200	C	17.8	270		C	15.4	87	
	NBT/R	-	-	-	-		-	-	-	
	SBL ²	50	A	10.0	81		B	10.1	96	
	SBT	-	-	-	-		-	-	-	
Build (2023) Conditions <i>With Median Acceleration Lane</i>	WBL ¹	-	D	25.5	150	N/A	C	20.7	75	N/A
	WBR ¹	200	D	25.5	139		C	20.7	101	
	NBT/R	-	-	-	-		-	-	-	
	SBL ²	100	B	10.1	84		B	10.2	130	
	SBT	-	-	-	-		-	-	-	

1. Level of service for minor approach
2. Level of service for major street left-turn movement
3. HCM methodology does not provide lane group or overall LOS, delay, and queue lengths for major street through movements or right turns at unsignalized intersections.

Table 7
Level-of-Service Summary for Rio Road at Dunlora Forest Drive

CONDITION	LANE GROUP	Storage Length (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay) ³	Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay) ³
Existing (2018) Traffic Conditions	WBL ¹	-	D	26.1	37	N/A	D	27.3	32	N/A
	WBR ¹	25	B	13.2	44		B	13.6	33	
	NBT	-	-	-	-		-	-	-	
	NBR	200	-	-	-		-	-	-	
	SBL ²	225	A	8.9	31		A	9.2	47	
	SBT	-	-	-	-		-	-	-	
No-Build (2023) Traffic Conditions	WBL ¹	-	D	34.2	44	N/A	E	36.8	27	N/A
	WBR ¹	25	B	14.6	44		C	15.1	22	
	NBT	-	-	-	-		-	-	-	
	NBR	200	-	-	-		-	-	-	
	SBL ²	225	A	9.3	33		A	9.7	36	
	SBT	-	-	-	-		-	-	-	
Build (2023) Traffic Conditions <i>By-Right</i>	WBL ¹	-	E	35.6	42	N/A	E	38.6	34	N/A
	WBR ¹	25	B	14.7	50		C	15.4	32	
	NBT	-	-	-	-		-	-	-	
	NBR	200	-	-	-		-	-	-	
	SBL ²	225	A	9.4	35		A	9.8	49	
	SBT	-	-	-	-		-	-	-	
Build (2023) Conditions	WBL ¹	-	E	36.4	46	N/A	E	39.6	37	N/A
	WBR ¹	25	B	14.8	39		C	15.6	29	
	NBT	-	-	-	-		-	-	-	
	NBR	200	-	-	-		-	-	-	
	SBL ²	225	A	9.4	37		A	9.8	53	
	SBT	-	-	-	-		-	-	-	

1. Level of service for minor approach
2. Level of service for major street left-turn movement
3. HCM methodology does not provide lane group or overall LOS, delay, and queue lengths for major street through movements or right turns at unsignalized intersections.

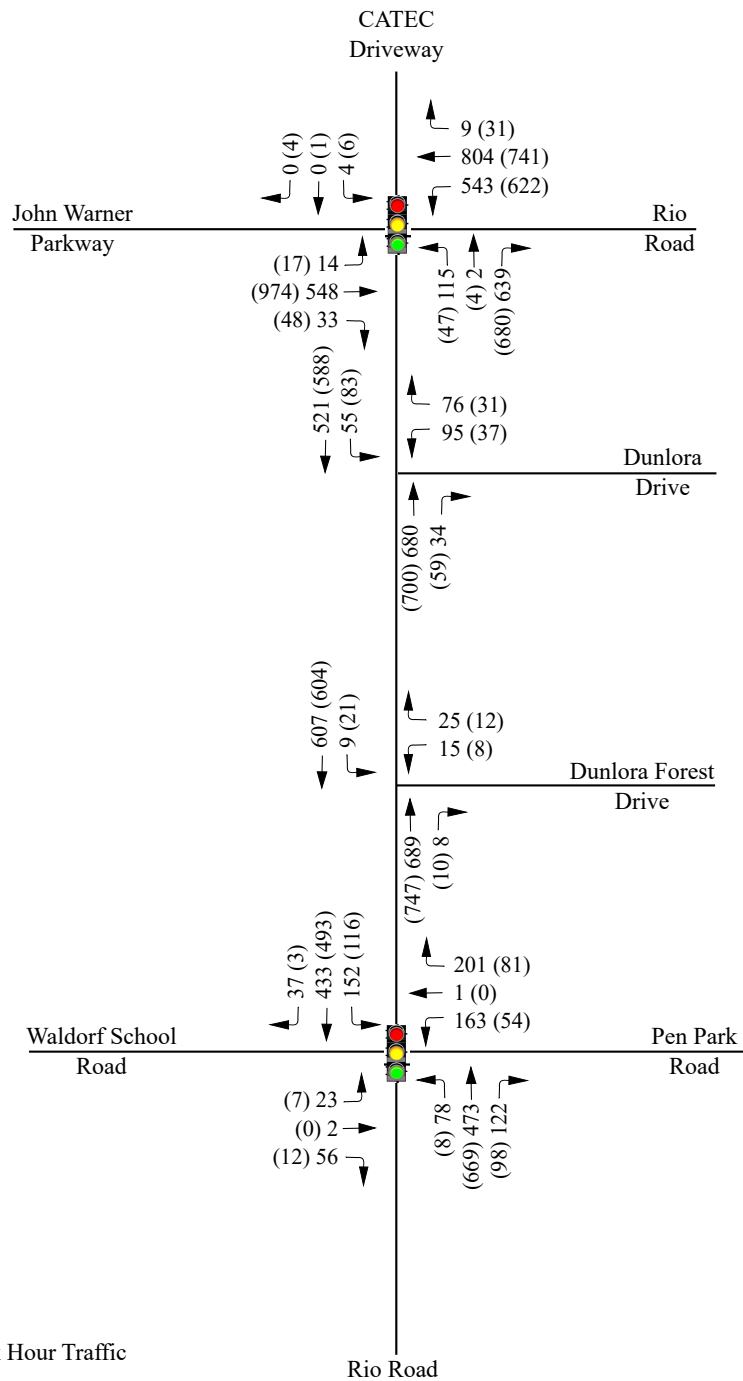
Table 8
Level-of-Service Summary for Rio Road at Pen Park Road / Waldorf School Road

CONDITION	LANE GROUP	Storage Length (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)
Existing (2018) Traffic Conditions	EBL/T/R	-	C	24.1	103	C (20.4 sec)	C	23.7	40	B (12.8 sec)
	WBL/T	350	D	35.2	188		C	24.4	80	
	WBR	-	C	31.0	124		C	29.3	67	
	NBL	75	B	12.3	130		A	8.1	56	
	NBT	-	B	19.2	261		B	13.5	252	
	NBR	125	B	14.3	152		A	8.8	149	
	SBL	225	B	13.6	142		A	9.4	108	
	SBT	-	B	16.4	305		A	8.7	217	
	SBR	100	B	12.0	156		A	6.4	23	
No-Build (2023) Traffic Conditions	EBL/T/R	-	C	30.5	135	C (24.9 sec)	C	26.6	44	B (13.9 sec)
	WBL/T	350	E	56.0	240		C	27.5	80	
	WBR	-	D	49.5	180		C	32.7	81	
	NBL	75	B	12.2	160		A	8.0	82	
	NBT	-	B	20.0	383		B	15.2	322	
	NBR	125	B	13.5	198		A	8.5	162	
	SBL	225	B	14.7	199		B	10.9	108	
	SBT	-	B	16.3	350		A	8.9	235	
	SBR	100	B	11.2	144		A	6.1	10	
Build (2023) Traffic Conditions <i>By-Right</i>	EBL/T/R	-	C	31.0	119	C (25.3 sec)	C	27.1	50	B (14.2 sec)
	WBL/T	350	E	57.3	250		C	28.1	92	
	WBR	-	D	51.2	188		C	33.4	91	
	NBL	75	B	12.4	169		A	7.9	69	
	NBT	-	C	20.2	378		B	15.7	411	
	NBR	125	B	13.5	210		A	8.4	209	
	SBL	225	B	14.8	217		B	11.2	126	
	SBT	-	B	16.6	390		A	8.9	246	
	SBR	100	B	11.1	155		A	6.0	13	
Build (2023) Conditions	EBL/T/R	-	C	31.3	124	C (25.6 sec)	C	27.4	52	B (14.4 sec)
	WBL/T	350	E	58.4	215		C	28.2	80	
	WBR	-	D	52.3	172		C	33.7	83	
	NBL	75	B	12.5	166		A	7.9	71	
	NBT	-	C	20.3	382		B	16.0	440	
	NBR	125	B	13.4	195		A	8.4	209	
	SBL	225	B	14.9	220		B	11.4	126	
	SBT	-	B	16.9	362		A	9.0	224	
	SBR	100	B	11.1	142		A	6.0	20	

Table 9
Level-of-Service Summary for Rio Road at Full-movement Driveway

CONDITION	LANE GROUP	Storage Length (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)
Build (2023) Conditions <i>By-Right</i>	EBL ¹	-	E	40.8	159	N/A ³	E	41.2	57	N/A ³
	EBR ¹	-	B	13.2	65		B	13.2	28	
	NBL ²	100	A	9.0	60		A	9.1	41	
	NBT	-	-	-	-		-	-	-	
	SBT/R	-	-	-	-		-	-	-	
Build (2023) Conditions <i>With Median Acceleration Lane</i>	EBL ¹	-	C	23.3	75	N/A ³	C	24.4	62	N/A ³
	EBR ¹	-	B	13.4	57		B	13.4	27	
	NBL ²	100	A	9.0	40		A	9.2	63	
	NBT	-	-	-	-		-	-	-	
	SBT/R	-	-	-	-		-	-	-	

1. Level of service for minor approach
2. Level of service for major street left-turn movement
3. HCM methodology does not provide lane group or overall LOS, delay, and queue lengths for major street through movements or right turns at unsignalized intersections.

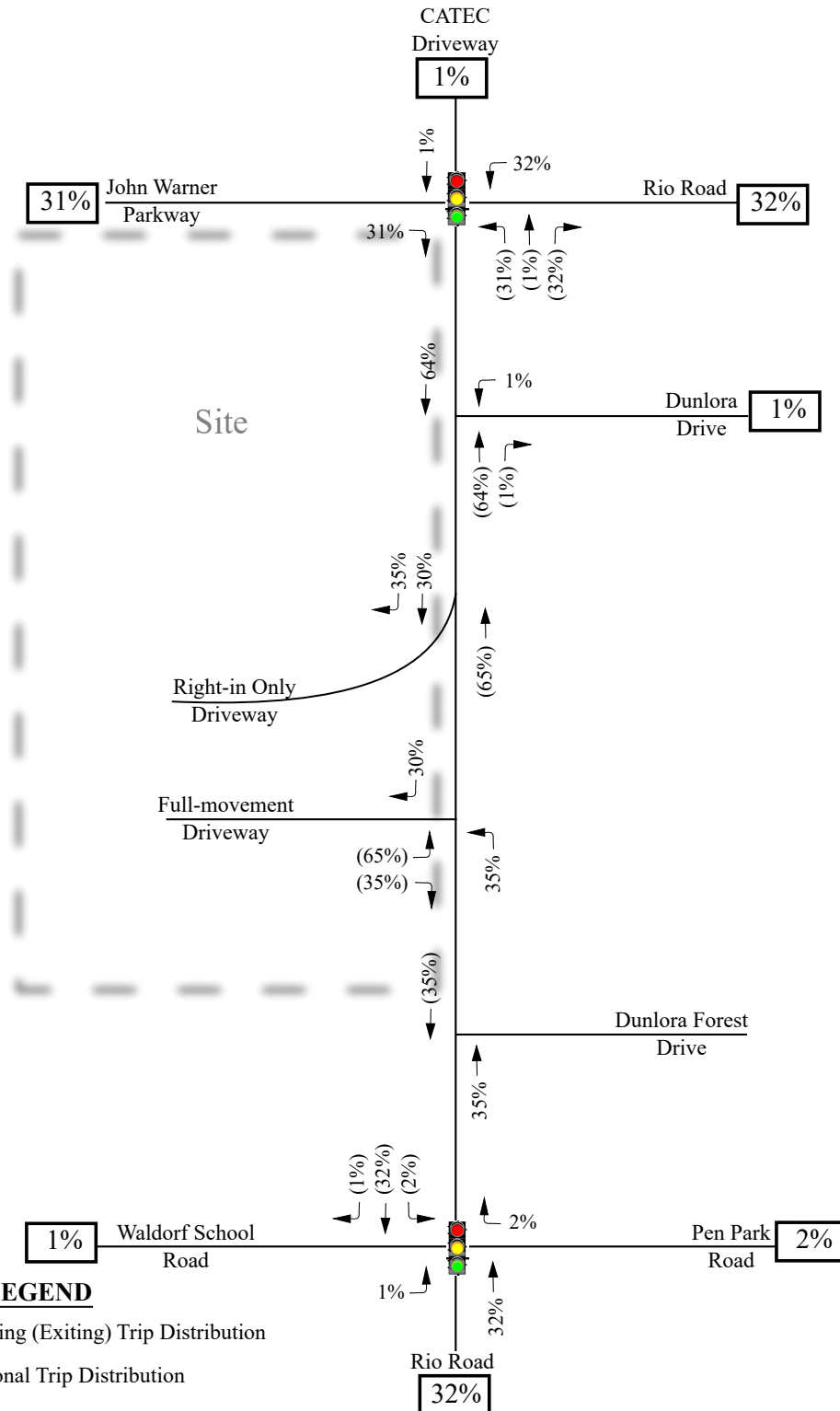


Rio Road Multi-Family
Albemarle County, Virginia

No-Build (2023)
Peak Hour Traffic Volumes
(By-Right)

Scale: Not to Scale

Figure 1



LEGEND

X% (Y%) Entering (Exiting) Trip Distribution

XX% Regional Trip Distribution

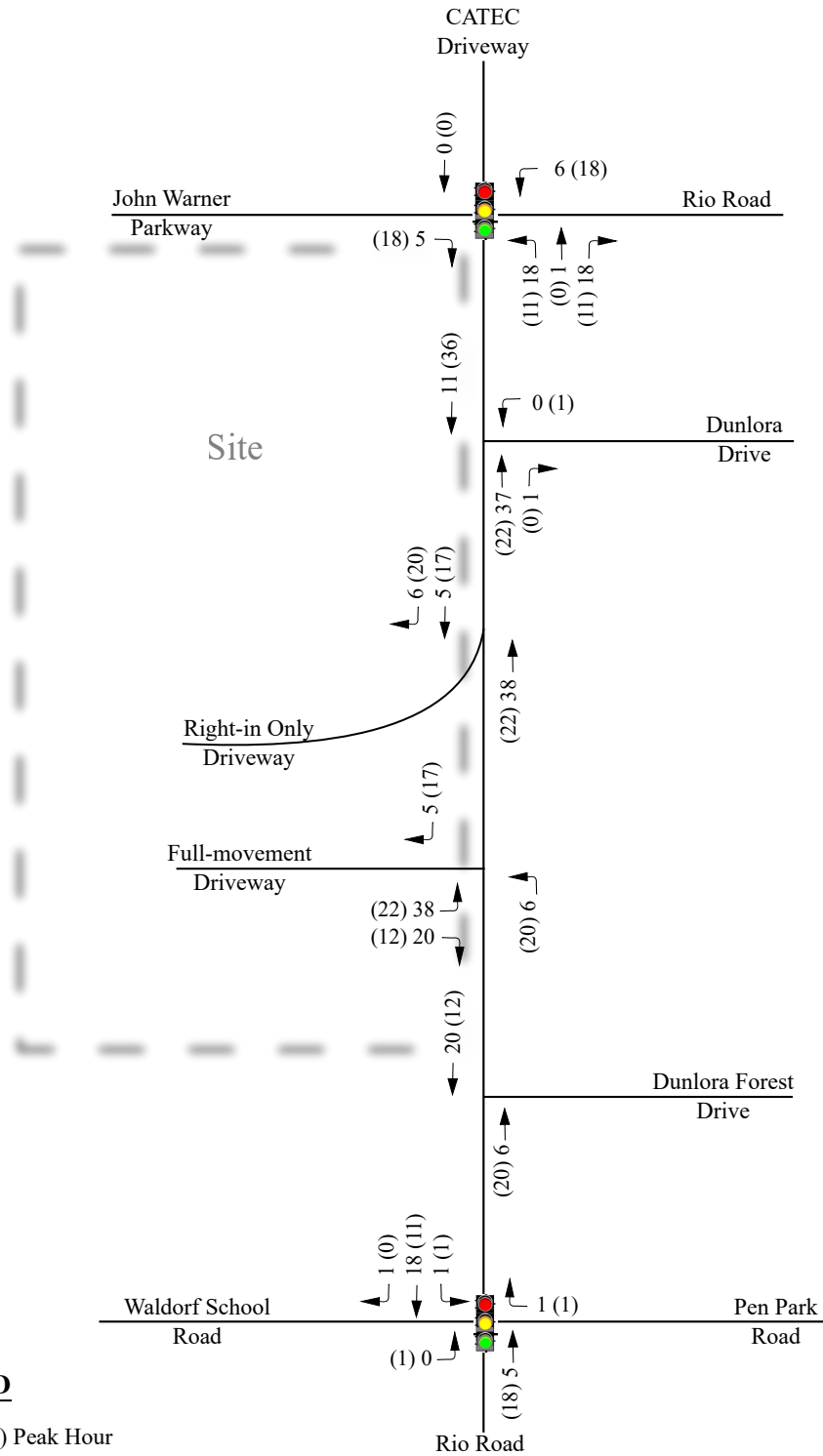


Rio Road Multi-Family
Albemarle County, Virginia

Site Trip Distribution
(By-Right)

Scale: Not to Scale

Figure 2



LEGEND

X (Y) AM (PM) Peak Hour

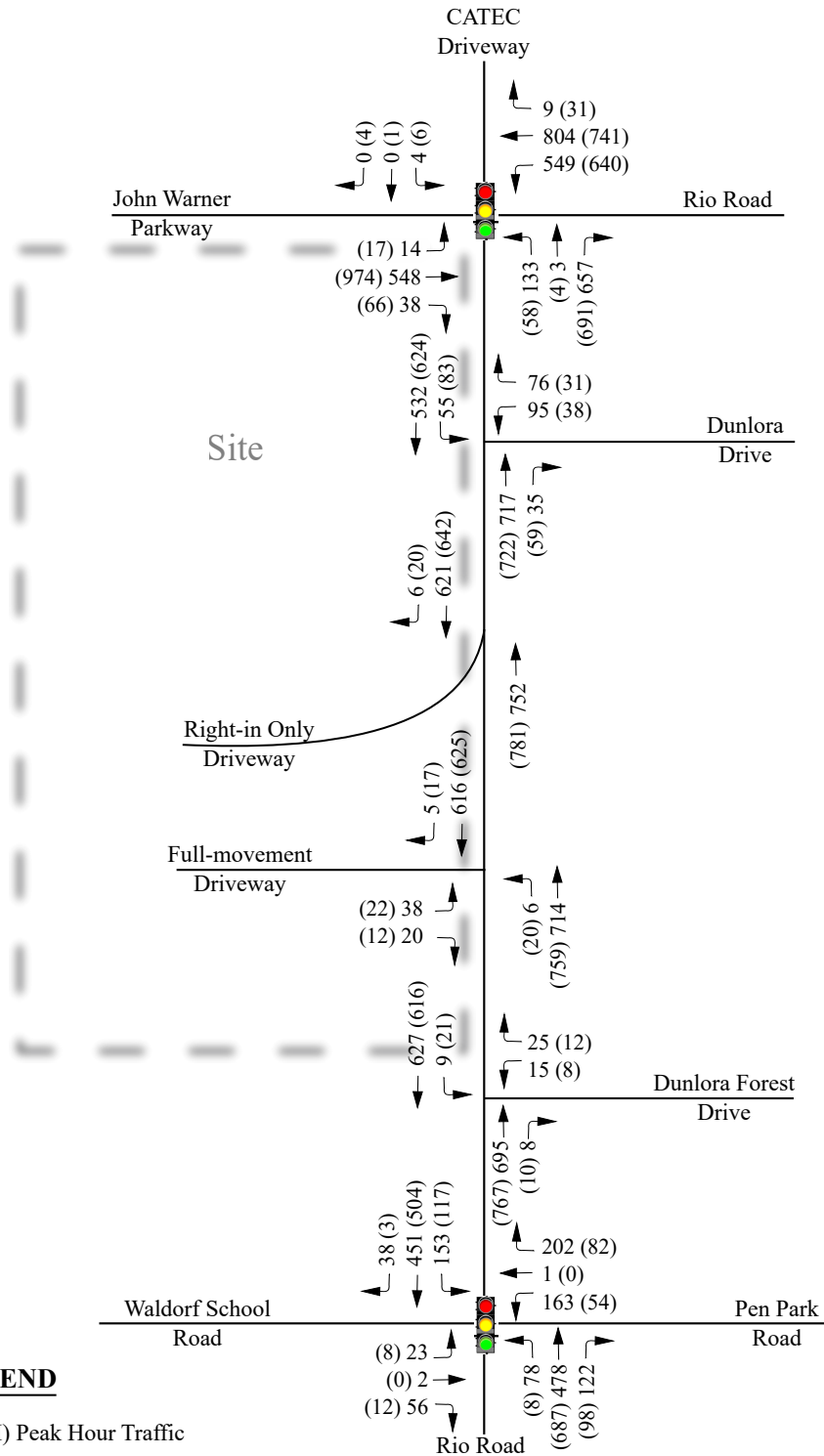


Rio Road Multi-Family
Albemarle County, Virginia

Site Trip Assignment
(By-Right)

Scale: Not to Scale

Figure 3



Rio Road Multi-Family
Albemarle County, Virginia

Build (2023) Peak Hour
Traffic Volumes
(By-Right)

Scale: Not to Scale

Figure 4

November 14, 2019

Mr. Kevin McDermott
Albemarle County
401 McIntire Road
Charlottesville, Virginia 22902
Phone: (434) 296-5832

Reference: Rio Road Multi-Family – Revised Traffic Impact Analysis (TIA)

Dear Mr. McDermott,

Ramey Kemp & Associates, Inc. (RKA) has performed a Traffic Impact Analysis (TIA) for the proposed 328-unit multi-family development located on the southwest corner of the Rio Road at John Warner Parkway / CATEC Driveway intersection. The access plan includes one full-movement driveway and one right-in only driveway on Rio Road and a stub-out for a future connection on the south side of the property. If approved, the proposed development is expected to be built in 2023. Figure 1 shows the site location and study intersections, and Figure 2 shows the preliminary site plan.

The purpose of this letter report is to provide the following:

- Trip generation calculations
- Evaluation of turn lane warrants for the site driveways
- Capacity and queueing analysis of the study intersections

Existing Roadway Conditions

Route 631 (Rio Road) is a four-lane divided Minor Arterial with a 2017 Virginia Department of Transportation (VDOT) average daily traffic (ADT) volume of approximately 28,000 vehicles per day (vpd) and a posted speed limit of 35 miles per hour (mph) north of the John Warner Parkway intersection. Rio Road becomes a two-lane Major Collector with an ADT volume of approximately 11,700 vpd and a posted speed limit of 35 mph south of the John Warner Parkway intersection. Note that the ADT along the property frontage was calculated assuming the AM and PM peak hour volumes represent 20% of the daily traffic.

Route 2500 (John Warner Parkway) is a two-lane Minor Arterial with a posted speed limit of 35 mph in the vicinity of the site and does not have a VDOT published ADT volume. Based on discussion with the County, the ADT is approximately 17,500 vpd.

Route 768 (Pen Park Road) is a two-lane local road with a 2017 VDOT ADT volume of approximately 4,300 vpd, and a posted speed limit of 35 mph in the vicinity of the site.

Route 1177 (Dunlora Drive) is a two-lane local road with a 2017 VDOT ADT volume of approximately 2,300 vpd, and a posted speed limit of 35 mph in the vicinity of the site.

Figure 3 shows existing lane configuration.

Existing Traffic Volumes

The AM peak hour (7:00 to 9:00 AM) and PM peak hour (4:00 to 6:00 PM) turning movement counts were conducted by Burns Service, Inc. during the week of August 27, 2018 at the following intersections:

- Rio Road at John Warner Parkway / CATEC Driveway
- Rio Road at Dunlora Drive
- Rio Road at Pen Park Road / Waldorf School Road

The AM peak hour (7:30 to 8:30 AM) and PM peak hour (4:45 – 5:45 PM) turning movements counts for Rio Road at Dunlora Forest Drive were conducted by RKA during the week of August 19, 2019.

Note that some volumes have been increased as necessary to balance between the Rio Road at John Warner Parkway / CATEC Driveway intersection and the Rio Road at Dunlora Drive intersection. The traffic count data are enclosed, and the existing volumes are shown in Figure 4.

Background Traffic Growth

Based on discussion with the County and VDOT, the 2018 peak hour traffic volumes were grown by an annual rate of 2.0% for five years to estimate the 2023 peak hour traffic volumes.

Approved Development Traffic

Based on discussion with the County and VDOT, three approved developments near the site are included in this TIA. Belvedere Residential is partially built-out, with 190 single family homes and 90 townhomes remaining to be built and is located at the end of Belvedere Boulevard. The trip generation potential of Belvedere Residential during a typical weekday, AM peak hour and PM peak hour was estimated using the methodologies published by the Institute of Transportation Engineers (ITE) *Trip Generation Manual – 10th Edition*.

Table 1
ITE Trip Generation – Belvedere Residential – Weekday – 10th Edition

Land Use (ITE Land Use Code)	Size	Weekday Daily Traffic (vpd)		AM Peak Hour (vph)		PM Peak Hour (vph)	
		Enter	Exit	Enter	Exit	Enter	Exit
Single Family Detached Housing (210)	190 homes	938	938	35	106	118	70
Multifamily Housing (Low-Rise) (220)	90 units	330	330	10	33	34	20
Total Trips		1,268	1,268	45	139	152	90

Figures 5 and 6 show the trip distribution and assignment for Belvedere Residential.

Dunlora Park Residential consists of 28 single family homes and 14 townhomes and is located on Varick Street. The ITE trip generation potential of Dunlora Park Residential is shown in Table 2.

Table 2
ITE Trip Generation – Dunlora Park Residential – Weekday – 10th Edition

Land Use (ITE Land Use Code)	Size	Weekday Daily Traffic (vpd)		AM Peak Hour (vph)		PM Peak Hour (vph)	
		Enter	Exit	Enter	Exit	Enter	Exit
Single Family Detached Housing (210)	28 homes	161	161	6	19	19	11
Multifamily Housing (Low-Rise) (220)	14 units	51	51	1	6	6	4
Total Trips		212	212	7	25	25	15

Figures 7 and 8 show the trip distribution and assignment for Dunlora Park Residential.

Lochlyn Hill Residential is partially built-out, with 129 single family homes and 14 townhomes remaining to be built and is located on the south side of Pen Park Lane. The ITE trip generation potential of Lochlyn Hill Residential is shown in Table 3.

Table 3
ITE Trip Generation – Lochlyn Hill Residential – Weekday – 10th Edition

Land Use (ITE Land Use Code)	Size	Weekday Daily Traffic (vpd)		AM Peak Hour (vph)		PM Peak Hour (vph)	
		Enter	Exit	Enter	Exit	Enter	Exit
Single Family Detached Housing (210)	129 homes	657	657	24	72	82	48
Multifamily Housing (Low-Rise) (220)	14 units	51	51	1	6	6	4
Total Trips		708	708	25	78	88	52

Figures 9 and 10 show the trip distribution and assignment for Lochlyn Hill Residential. The total approved development trips are shown in Figure 11. The total approved development trips were combined with the background growth to estimate the 2023 no-build traffic volumes, which are shown in Figure 12.

There are several other small developments currently under construction near the site (such as The Center at Belvidere). Based on discussion with the County, it was determined that the trip generation potential of these sites is captured in the 2% annual growth rate.

Trip Generation

The trip generation potential of the proposed neighborhood during a typical weekday, AM peak hour, and PM peak hour was estimated using the methodologies published by the Institute of Transportation Engineers (ITE) *Trip Generation Manual – 10th Edition*. Table 4 summarizes the trip generation calculations.

Table 4
ITE Trip Generation – Typical Weekday – 10th Edition

Land Use (ITE Land Use Code)	Size	Average Daily Traffic (vpd)		AM Peak Hour (vph)		PM Peak Hour (vph)	
		Enter	Exit	Enter	Exit	Enter	Exit
Multifamily Housing (Mid-Rise) (221)	328 units	893	893	31	87	85	54

It should be noted that Rio Road is an existing transit corridor, and some of the future residents living along Rio Road will likely use the transit service. This will reduce the number of vehicles on Rio Road. To be conservative, this reduction was not applied to the trip generation potential of the site or the surrounding approved developments.

Site Traffic Distribution

The following site traffic distribution was applied based on coordination with the County and VDOT:

- 32% to / from the north on Rio Road
- 32% to / from the south on Rio Road
- 31% to / from the south on John Warner Parkway
- 2% to / from the east on Pen Park Road
- 1% to / from the south on Waldorf School Road
- 1% to / from the north on CATEC Driveway
- 1% to / from the north on Dunlora Drive

Figures 13 and 14 show the site trip distribution and site trip assignment, respectively. Figure 15 shows the projected 2023 build-out peak hour traffic volumes.

VDOT Turn Lane Warrant Analysis

The projected build-out AM and PM peak hour traffic volumes at the proposed site driveways were compared to the turn lane warrants in the Virginia Department of Transportation (VDOT) *Access Management Design Standards for Entrances and Intersections*:

Rio Road at Right-in Only Driveway:

- A southbound right-turn taper on Rio Road is warranted in the PM peak hour

Rio Road at Full-Movement Driveway:

- A northbound left-turn lane on Rio Road is warranted
- A southbound right-turn taper on Rio Road is warranted in the PM peak hour

Intersection Spacing Standards

VDOT requires at least 250 feet of separation between partial access driveways and full-movement driveways / intersections on Major Collector roadways. The proposed right-in only driveway is approximately 180 feet south of Dunlora Drive and 500 feet north of the proposed full-movement driveway. The proposed right-in only driveway does not meet VDOT's minimum intersection spacing standards, so an Access Management Exception (AME) request will be submitted.

VDOT requires at least 335 feet of separation between full-movement driveways and intersections on Major Collector roadways. The proposed full-movement driveway is approximately 560 feet north of Dunlora Forest Drive. The proposed full-movement driveway exceeds VDOT's minimum intersection spacing standards.

Traffic Capacity Analysis

Traffic capacity analysis for the study intersections was performed using Synchro 10, which is a comprehensive software package that allows the user to model signalized and unsignalized intersections to determine levels-of-service based on the thresholds specified in the Highway Capacity Manual (HCM) – 6th Edition. All queues reported are the maximum SimTraffic queues based on the average of 10 microsimulation runs.

Note that Rio Road is considered an east / west roadway but is north / south in the vicinity of the site. Additionally, John Warner Parkway, Dunlora Drive, Pen Park Road, and Waldorf School Road are all east / west roadways in the vicinity of the site.

Table 5 summarizes the capacity analysis results for the signalized intersection of Rio Road at John Warner Parkway / CATEC Driveway, and the Synchro and SimTraffic outputs are enclosed for reference.

Table 5
Level-of-Service Summary for Rio Road at John Warner Parkway / CATEC Driveway

CONDITION	LANE GROUP	Storage Length (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)
Existing (2018) Traffic Conditions	EBL	200	F	114.2	47	D (50.2 sec)	F	114.4	276	D (52.3 sec)
	EBT/R	300	D	40.3	314		D	52.6	782	
	WBL	-	F	84.0	466		F	83.6	654	
	WBT	-	B	13.0	310		B	12.5	330	
	WBR	500	A	7.1	19		A	7.3	29	
	NBL/T	75	F	84.3	124		E	78.6	124	
	NBR	-	E	67.3	190		E	64.3	180	
	SBL/T	-	F	113.6	23		F	103.6	30	
No-Build (2023) Traffic Conditions	SBR	125	F	98.5	6	D (53.7 sec)	F	101.5	11	E (59.9 sec)
	EBL	200	F	114.4	100		F	115.0	299	
	EBT/R	300	D	47.2	471		E	76.8	1,289	
	WBL	-	F	83.4	581		F	83.9	803	
	WBT	-	B	15.7	481		B	14.4	455	
	WBR	500	A	7.2	24		A	7.4	32	
	NBL/T	75	F	89.4	124		E	79.3	124	
	NBR	-	E	74.4	213		E	61.5	191	
Build (2023) Traffic Conditions <i>Without Improvements</i>	SBL/T	-	F	113.6	22	E (57.1 sec)	F	104.0	35	E (64.4 sec)
	SBR	125	F	98.5	6		F	100.4	13	
	EBL	200	F	114.4	102		F	115.0	299	
	EBT/R	300	D	48.5	391		F	89.7	1,352	
	WBL	-	F	83.3	568		F	85.2	801	
	WBT	-	B	15.7	461		B	14.5	581	
	WBR	500	A	7.2	19		A	7.4	32	
	NBL/T	75	F	104.8	124		F	80.5	124	
Build (2023) Traffic Conditions <i>With Median Acceleration Lane</i>	NBR	-	F	81.8	215	E (57.1 sec)	E	59.5	192	E (64.4 sec)
	SBL/T	-	F	113.6	22		F	104.2	28	
	SBR	125	F	98.5	7		F	99.5	10	
	EBL	200	F	114.4	233		F	115.0	254	
	EBT/R	300	D	48.5	424		F	89.7	1,341	
	WBL	-	F	83.3	595		F	85.2	816	
	WBT	-	B	15.7	488		B	14.5	536	
	WBR	500	A	7.2	26		A	7.4	33	
	NBL/T	-	F	104.8	179		F	80.5	164	
	NBR	-	F	81.8	178		E	59.5	183	
	SBL/T	-	F	113.6	13		F	104.2	22	
	SBR	125	F	98.5	2		F	99.5	5	

Capacity analysis indicates that the intersection currently operates at LOS D during the AM and PM peak hours. Under no-build conditions, the intersection is expected to operate at LOS D during the AM peak hour and at LOS E during the PM peak hour.

Under build conditions (without improvements), the intersection is expected to operate at LOS E during the AM and PM peak hours.

Under build conditions (with median acceleration lane), the intersection is expected to operate at LOS E during the AM and PM peak hours with the following improvement:

- Restripe the existing northbound shared left-through lane on Rio Road to extend the existing storage to Dunlora Drive

Table 6 summarizes the capacity analysis results for the unsignalized intersection of Rio Road at Dunlora Drive, and the Synchro and SimTraffic outputs are enclosed for reference. Note that HCM 6 reports were used for the existing, no-build, and build without improvements scenarios. HCM 2000 reports were used for the build with median acceleration lane scenario because HCM 6 does not accurately report two-stage left-turn movements.

Table 6
Level-of-Service Summary for Rio Road at Dunlora Drive

CONDITION	LANE GROUP	Storage Length (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay) ³	Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay) ³
Existing (2018) Conditions	WBL ¹	-	E	45.1	107	N/A	D	34.1	58	N/A
	WBR ¹	200	B	14.6	106		B	13.5	66	
	NBT/R	-	-	-	-		-	-	-	
	SBL ²	50	A	9.3	65		A	9.4	92	
	SBT	-	-	-	-		-	-	-	
No-Build (2023) Conditions	WBL ¹	-	F	120.1	287	N/A	F	58.8	78	N/A
	WBR ¹	200	C	16.9	210		C	15.0	84	
	NBT/R	-	-	-	-		-	-	-	
	SBL ²	50	A	9.8	80		A	10.0	98	
	SBT	-	-	-	-		-	-	-	
Build (2023) Conditions <i>Without Improvements</i>	WBL ¹	-	F	164.3	401	N/A	F	73.4	123	N/A
	WBR ¹	200	C	18.3	255		C	15.6	135	
	NBT/R	-	-	-	-		-	-	-	
	SBL ²	50	B	10.1	84		B	10.2	93	
	SBT	-	-	-	-		-	-	-	
Build (2023) Conditions <i>With Median Acceleration Lane</i>	WBL ¹	-	D	25.5	150	N/A	C	20.7	75	N/A
	WBR ¹	200	D	25.5	139		C	20.7	101	
	NBT/R	-	-	-	-		-	-	-	
	SBL ²	100	B	10.1	84		B	10.2	130	
	SBT	-	-	-	-		-	-	-	

- Level of service for minor approach
- Level of service for major street left-turn movement
- HCM methodology does not provide lane group or overall LOS, delay, and queue lengths for major street through movements or right turns at unsignalized intersections.

Capacity analysis indicates that the minor street left-turn movement currently operates with moderate delays (between 25 and 50 seconds) during both the AM and PM peak hours. Under no-build conditions, the minor street left-turn movement is expected to operate with long delays (greater than 50 seconds) during both peak hours.

Under build conditions (without improvements), capacity analysis indicates that the minor street left-turn movement is expected to operate with long delays (greater than 50 seconds) during the AM and PM peak

Under build conditions (with median acceleration lane), capacity analysis indicates that the minor street left-turn movement is expected to operate with moderate delays (between 25 and 50 seconds) during the AM peak hour and short delays (less than 25 seconds) during PM peak hour with the following improvements:

- Construct one southbound through lane on Rio Road
- Restripe the existing southbound through lane on Rio Road as a dedicated left-turn lane with 100 feet of storage

Collision data was obtained from the Virginia Crash GIS published by VDOT based on data from the Virginia Department of Motor Vehicles (DMV). Data was reported from January 1, 2013 to December 31, 2017 within 150 feet of the study intersection. There have only been five reported collisions over the last 5 years and just one angle crash, so the intersection does not meet the warrant of five or more correctable collisions over a twelve-month period. Additionally, the collision data does not indicate an unusual crash pattern that would be mitigated with the installation of a traffic signal.

Table 7 summarizes the capacity analysis results for the unsignalized intersection of Rio Road at Dunlora Forest Drive, and the Synchro and SimTraffic outputs are enclosed for reference.

Table 7
Level-of-Service Summary for Rio Road at Dunlora Forest Drive

CONDITION	LANE GROUP	Storage Length (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay) ³	Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay) ³
Existing (2018) Traffic Conditions	WBL ¹	-	D	26.1	37	N/A	D	27.3	32	N/A
	WBR ¹	25	B	13.2	44		B	13.6	33	
	NBT	-	-	-	-		-	-	-	
	NBR	200	-	-	-		-	-	-	
	SBL ²	225	A	8.9	31		A	9.2	47	
	SBT	-	-	-	-		-	-	-	
No-Build (2023) Traffic Conditions	WBL ¹	-	D	34.2	44	N/A	E	36.8	27	N/A
	WBR ¹	25	B	14.6	44		C	15.1	22	
	NBT	-	-	-	-		-	-	-	
	NBR	200	-	-	-		-	-	-	
	SBL ²	225	A	9.3	33		A	9.7	36	
	SBT	-	-	-	-		-	-	-	
Build (2023) Conditions	WBL ¹	-	E	36.4	46	N/A	E	39.6	37	N/A
	WBR ¹	25	B	14.8	39		C	15.6	29	
	NBT	-	-	-	-		-	-	-	
	NBR	200	-	-	-		-	-	-	
	SBL ²	225	A	9.4	37		A	9.8	53	
	SBT	-	-	-	-		-	-	-	

1. Level of service for minor approach
2. Level of service for major street left-turn movement
3. HCM methodology does not provide lane group or overall LOS, delay, and queue lengths for major street through movements or right turns at unsignalized intersections.

Capacity analysis indicates that the minor street left-turn movement currently operates with moderate delays (between 25 and 50 seconds) during both the AM and PM peak hours. Under no-build conditions, the minor

street left-turn movement is expected to continue to operate with moderate delays (between 25 and 50 seconds) during both the AM and PM peak hours.

Under build conditions, capacity analysis indicates that the minor street left-turn movement is expected to continue to operate with moderate delays (between 25 and 50 seconds) during both the AM and PM peak hours.

No improvements are warranted or recommended at this intersection at build out of the neighborhood.

Table 8 summarizes the capacity analysis results for the signalized intersection of Rio Road at Pen Park Road / Waldorf School Road, and the Synchro and SimTraffic outputs are enclosed for reference.

Table 8
Level-of-Service Summary for Rio Road at Pen Park Road / Waldorf School Road

CONDITION	LANE GROUP	Storage Length (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)
Existing (2018) Traffic Conditions	EBL/T/R	-	C	24.1	103	C (20.4 sec)	C	23.7	40	B (12.8 sec)
	WBL/T	350	D	35.2	188		C	24.4	80	
	WBR	-	C	31.0	124		C	29.3	67	
	NBL	75	B	12.3	130		A	8.1	56	
	NBT	-	B	19.2	261		B	13.5	252	
	NBR	125	B	14.3	152		A	8.8	149	
	SBL	225	B	13.6	142		A	9.4	108	
	SBT	-	B	16.4	305		A	8.7	217	
No-Build (2023) Traffic Conditions	SBR	100	B	12.0	156	C (24.9 sec)	A	6.4	23	B (13.9 sec)
	EBL/T/R	-	C	30.5	135		C	26.6	44	
	WBL/T	350	E	56.0	240		C	27.5	80	
	WBR	-	D	49.5	180		C	32.7	81	
	NBL	75	B	12.2	160		A	8.0	82	
	NBT	-	B	20.0	383		B	15.2	322	
	NBR	125	B	13.5	198		A	8.5	162	
	SBL	225	B	14.7	199		B	10.9	108	
Build (2023) Conditions	SBT	-	B	16.3	350	C (25.6 sec)	A	8.9	235	B (14.4 sec)
	SBR	100	B	11.2	144		A	6.1	10	
	EBL/T/R	-	C	31.3	124		C	27.4	52	
	WBL/T	350	E	58.4	215		C	28.2	80	
	WBR	-	D	52.3	172		C	33.7	83	
	NBL	75	B	12.5	166		A	7.9	71	
	NBT	-	C	20.3	382		B	16.0	440	
	NBR	125	B	13.4	195		A	8.4	209	
	SBL	225	B	14.9	220		B	11.4	126	
	SBT	-	B	16.9	362		A	9.0	224	
	SBR	100	B	11.1	142		A	6.0	20	

Capacity analysis indicates that the intersection currently operates at LOS C during the AM peak hour and LOS B during the PM peak hour. Under no-build conditions, the intersection is expected to continue to operate at LOS C during the AM peak hour and LOS B during the PM peak hour.

Under build conditions, capacity analysis indicates that the intersection is expected to continue to operate at LOS C during the AM peak hour and LOS B during the PM peak hour with all movements at LOS E or better.

No improvements are warranted or recommended at this intersection at build out of the neighborhood.

It should be noted that the County has submitted a SMART Scale project application to convert the existing signalized Rio Road at Pen Park Road intersection into a roundabout. If the application is successful, and the roundabout is constructed, the roundabout will likely improve the overall LOS for the intersection and will not have an impact on other intersections in this analysis.

Table 9 summarizes the capacity analysis results for the unsignalized intersection of Rio Road and Full-movement Driveway, and the Synchro and SimTraffic outputs are enclosed for reference. Note that HCM 6 reports were used for the median acceleration lane scenario. HCM 2000 reports were used for the build with median acceleration lane scenario because HCM 6 does not accurately report two-stage left-turn movements.

Table 9
Level-of-Service Summary for Rio Road at Full-movement Driveway

CONDITION	LANE GROUP	Storage Length (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Lane Queue (ft)	Overall LOS (Delay)
Build (2023) Conditions <i>Without Improvements</i>	EBL ¹	-	F	50.8	149	N/A ³	E	49.9	83	N/A ³
	EBR ¹	-	B	13.4	70		B	13.3	36	
	NBL ²	100	A	9.0	61		A	9.2	74	
	NBT	-	-	-	-		-	-	-	
	SBT/R	-	-	-	-		-	-	-	
Build (2023) Conditions <i>With Median Acceleration Lane</i>	EBL ¹	-	C	23.3	75	N/A ³	C	24.4	62	N/A ³
	EBR ¹	-	B	13.4	57		B	13.4	27	
	NBL ²	100	A	9.0	40		A	9.2	63	
	NBT	-	-	-	-		-	-	-	
	SBT/R	-	-	-	-		-	-	-	

1. Level of service for minor approach
2. Level of service for major street left-turn movement
3. HCM methodology does not provide lane group or overall LOS, delay, and queue lengths for major street through movements or right turns at unsignalized intersections.

Under build conditions (without improvements), capacity analysis indicates that the minor street left-turn movement is expected to operate with long delays (greater than 50 seconds) during the AM peak hour and moderate delays (between 25 and 50 seconds) during PM peak hours.

Under build conditions (with median acceleration lane), capacity analysis indicates that the minor street left-turn movement is expected to operate with short delays (less than 25 seconds) during the AM and PM peak hours with the following improvements:

- Construct a northbound left-turn lane on Rio Road with 100 feet of storage and 100 feet of taper
- Construct a 100 foot southbound right-turn taper on Rio Road
- Construct the site driveway with one ingress lane and two egress lanes

Recommendations

Based on the trip generation potential of the site, the following improvements are recommended:

Rio Road at John Warner Parkway / CATEC Driveway:

- Restripe the existing northbound shared left-through lane on Rio Road to extend the existing storage to Dunlora Drive

Rio Road at Dunlora Drive:

- Construct one southbound through lane on Rio Road
- Restripe the existing southbound through lane on Rio Road as a dedicated left-turn lane with 100 feet of storage
- Construct a southbound acceleration lane on Rio Road

Rio Road at Right-in Only Driveway:

- Construct a 100 foot southbound right-turn taper on Rio Road
- Construct the site driveway with one ingress lane

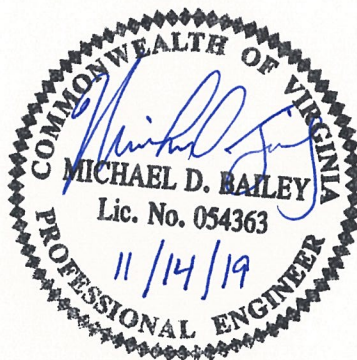
Rio Road at Full-movement Driveway:

- Construct a northbound left-turn lane on Rio Road with 100 feet of storage and 100 foot taper
- Construct a 100 foot southbound right-turn taper on Rio Road
- Construct a northbound acceleration lane on Rio Road
- Construct the site driveway with one ingress lane and two egress lanes

Figure 16 shows the recommended lane configuration.

We appreciate your attention to this matter. Please contact me at (804) 217-8560 if you have any questions about this report.

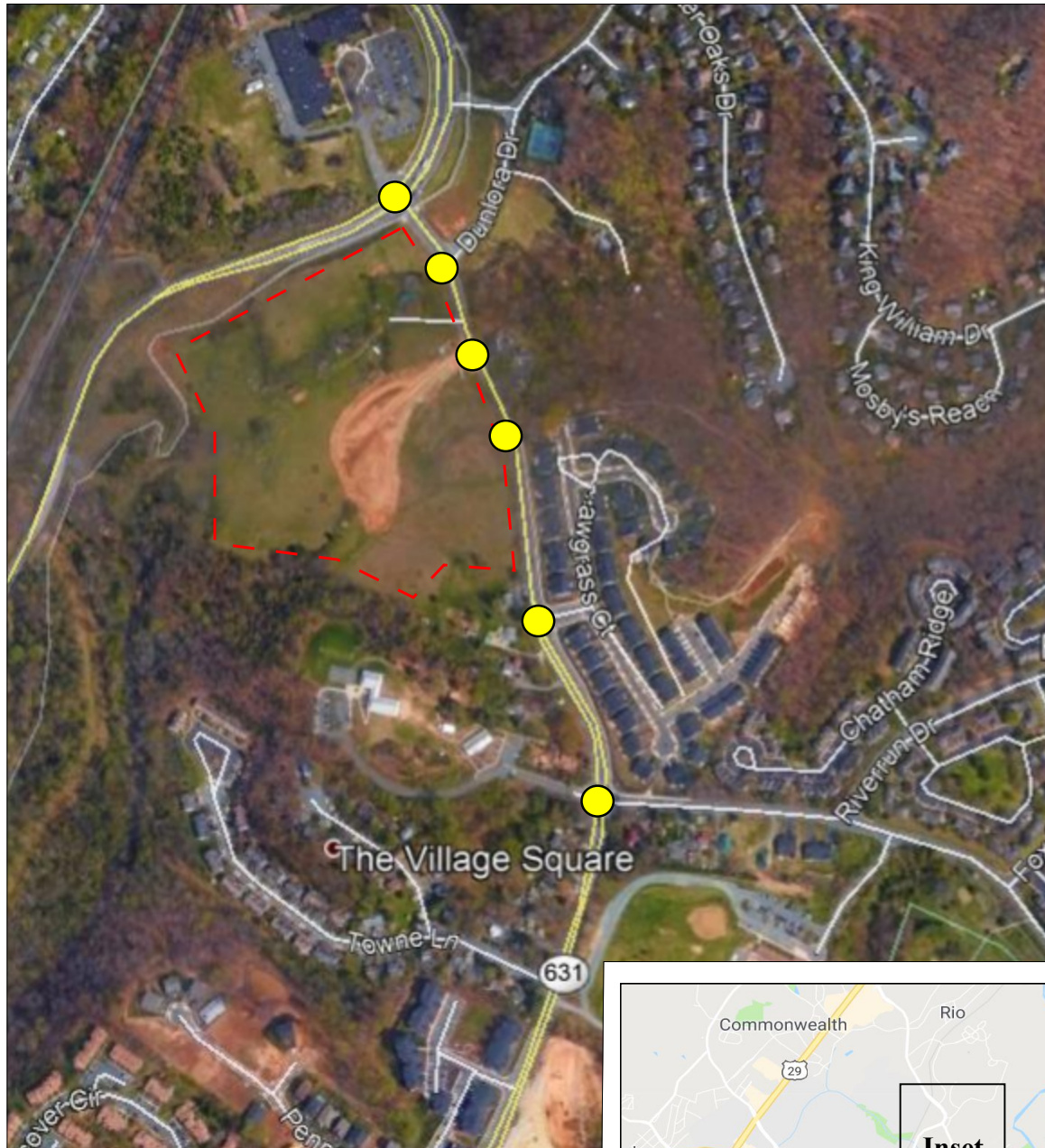
Sincerely yours,
Ramey Kemp & Associates, Inc.



Michael Bailey, P.E., PTOE
Project Manager

Enclosures: Figures, VDOT turn lane warrant diagrams, Traffic count data, Synchro output

Copy to: Mr. Adam Moore, P.E., VDOT
Mr. Ryan Hambleton, Kotarides
Mr. Scott Collins, P.E., Collins Engineering
Mr. Bill Mechnick, LPDA



Inset



LEGEND



Study Intersection



Site Boundary



Overview

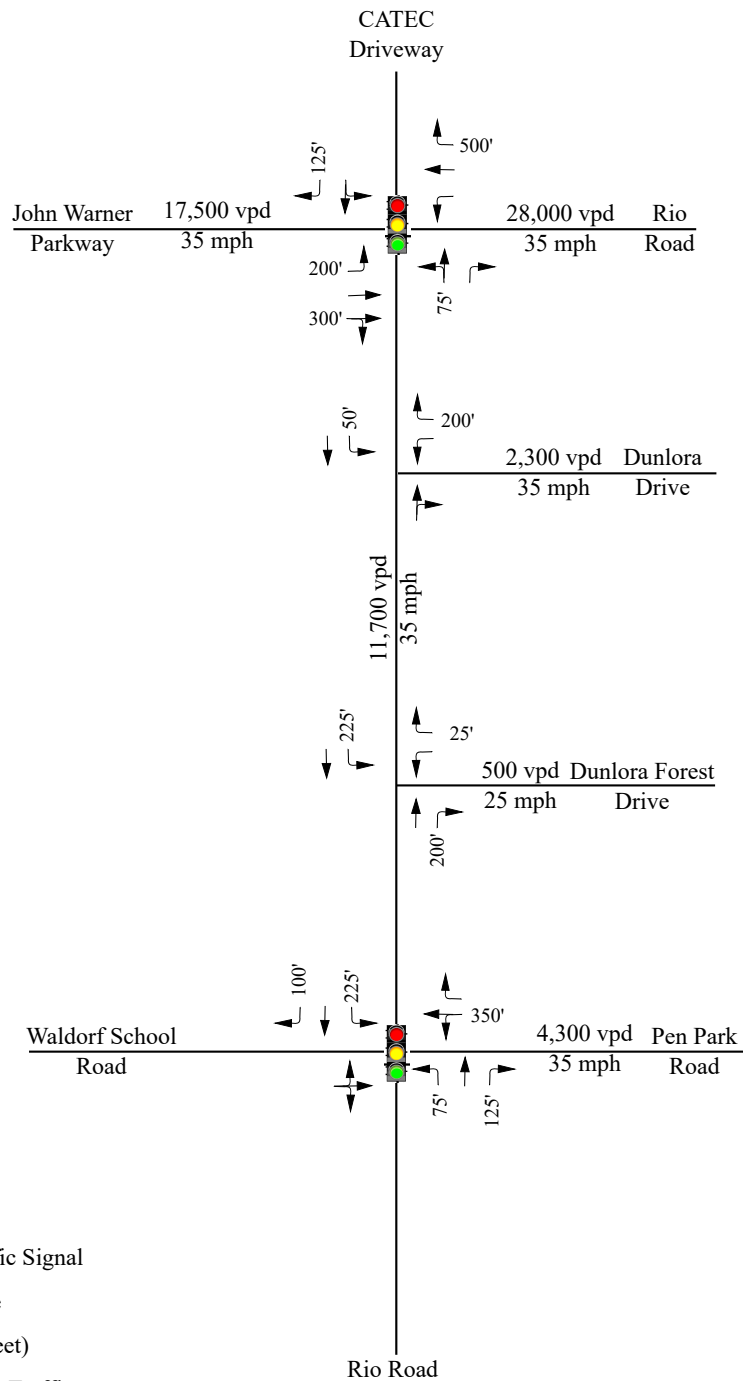


Rio Road Multi-Family
Albemarle County, Virginia

Site Location and
Study Intersections

Scale: Not to Scale

Figure 1

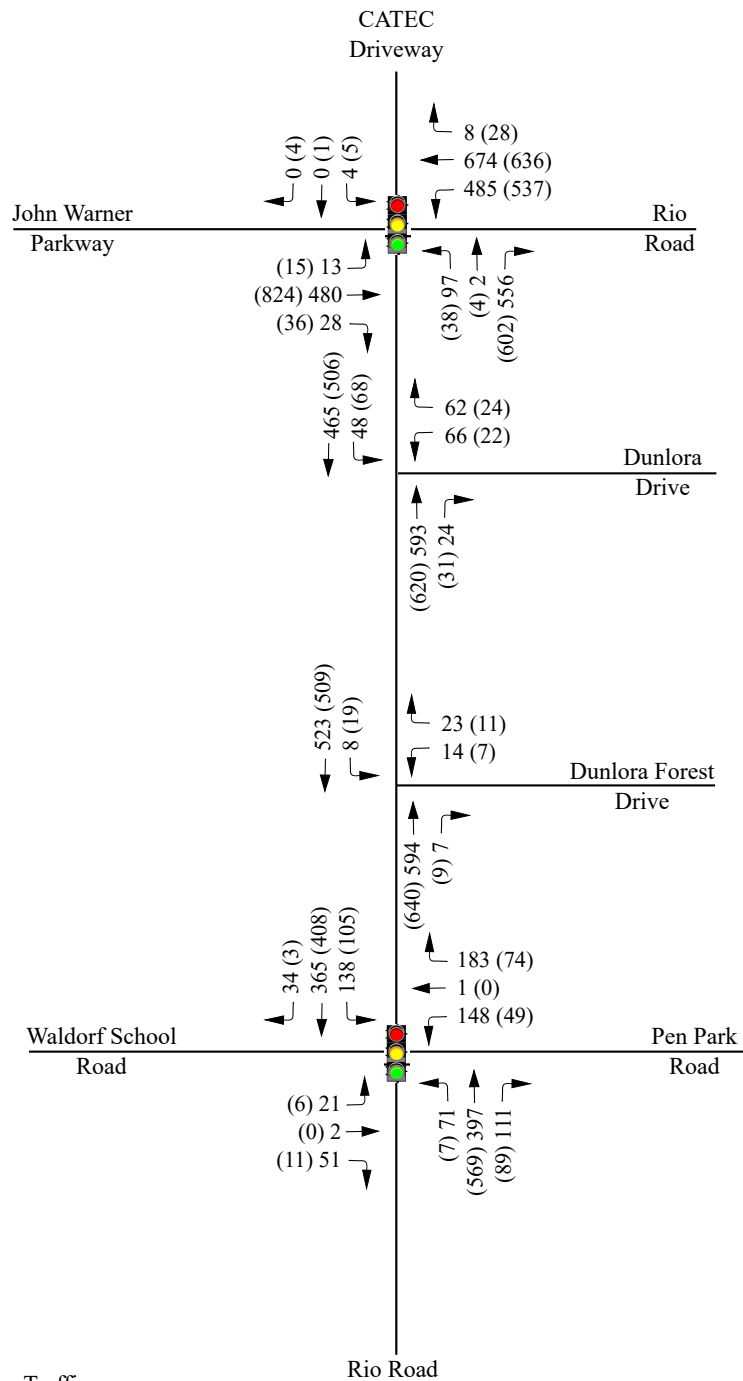


Rio Road Multi-Family
Albemarle County, Virginia

Existing (2018)
Lane Configurations

Scale: Not to Scale

Figure 3



LEGEND

X (Y) AM (PM) Peak Hour Traffic

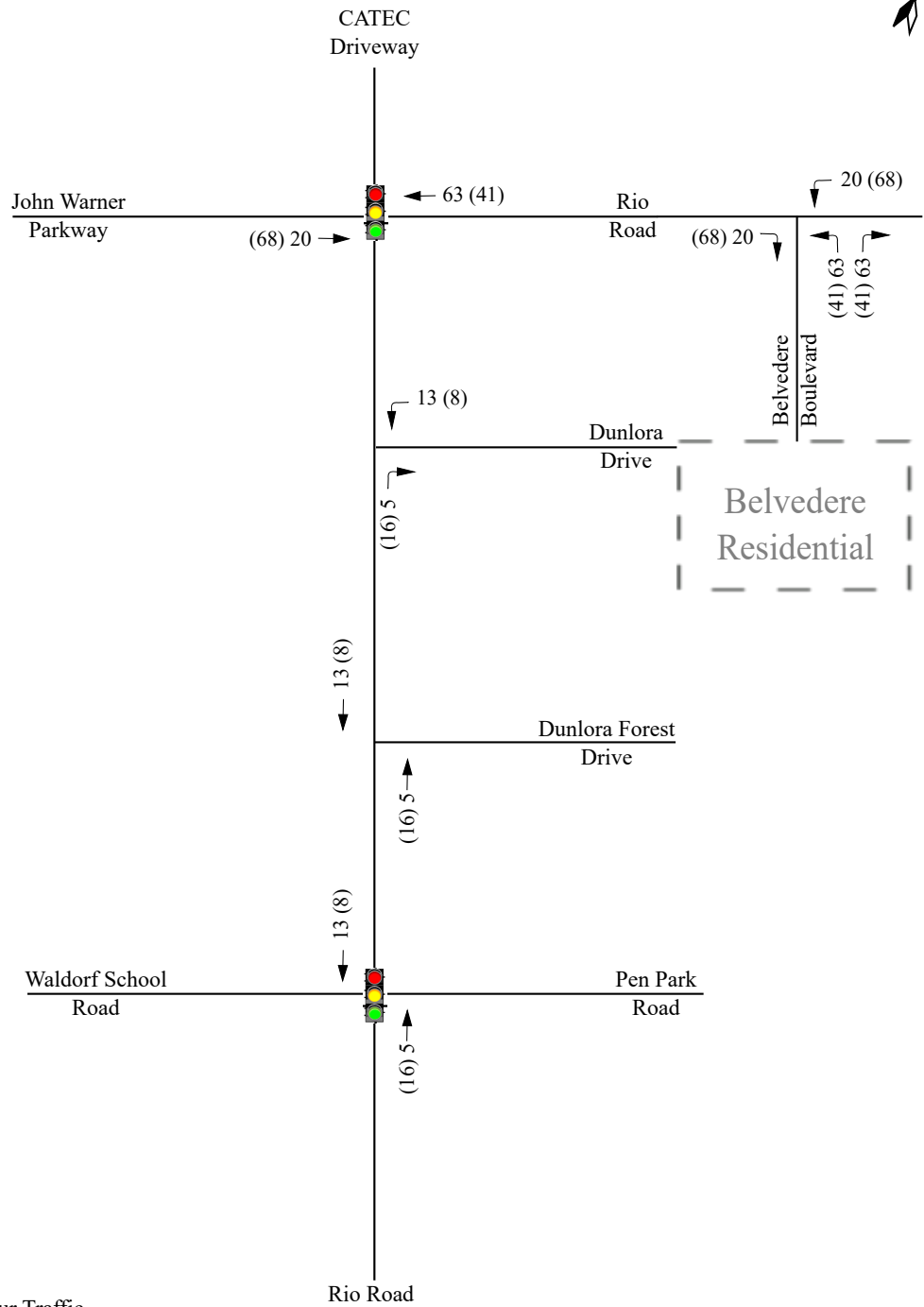


Rio Road Multi-Family
Albemarle County, Virginia

Existing (2018)
Peak Hour Traffic Volumes

Scale: Not to Scale

Figure 4

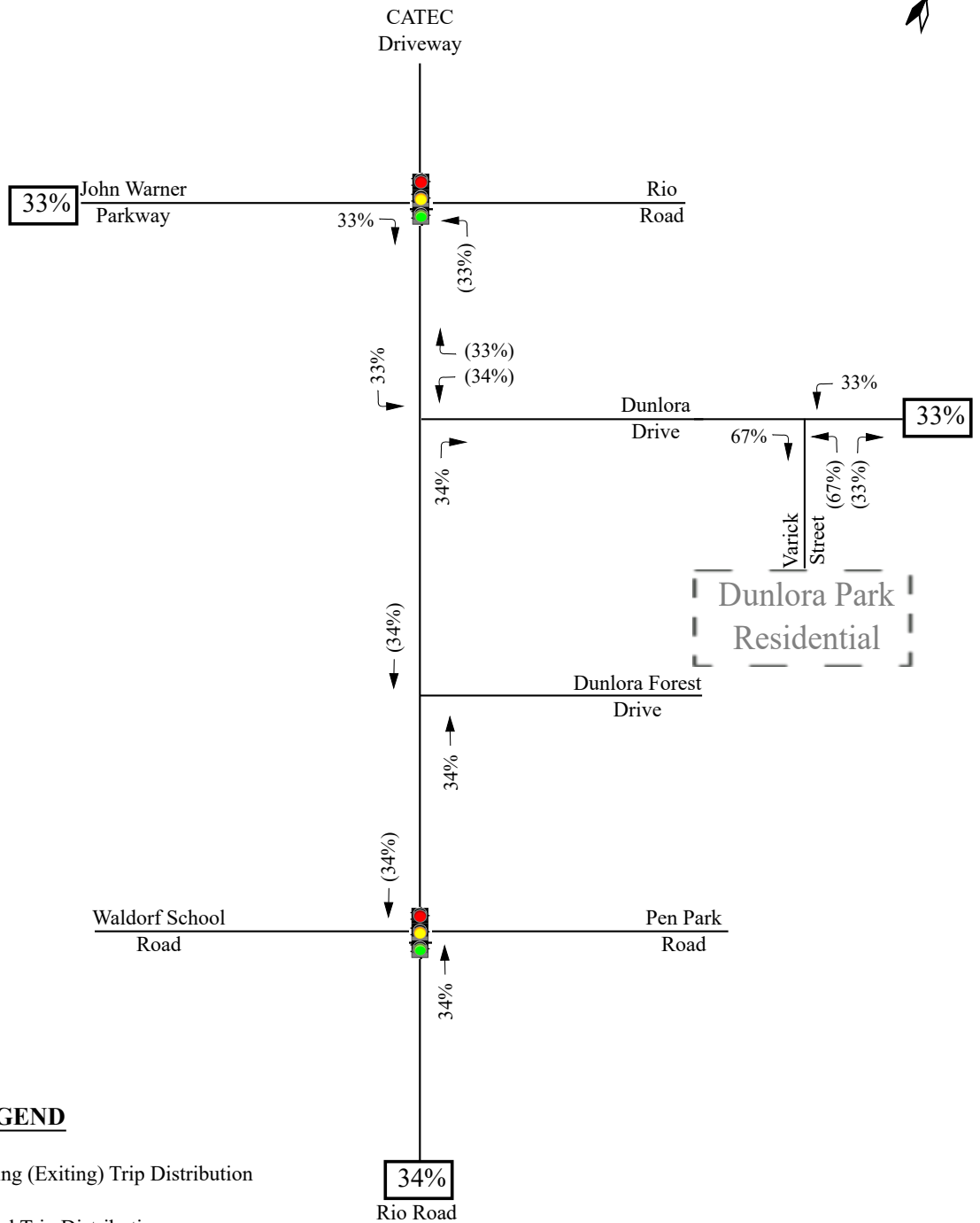


Rio Road Multi-Family
Albemarle County, Virginia

Belvedere Residential
Assignment

Scale: Not to Scale

Figure 6

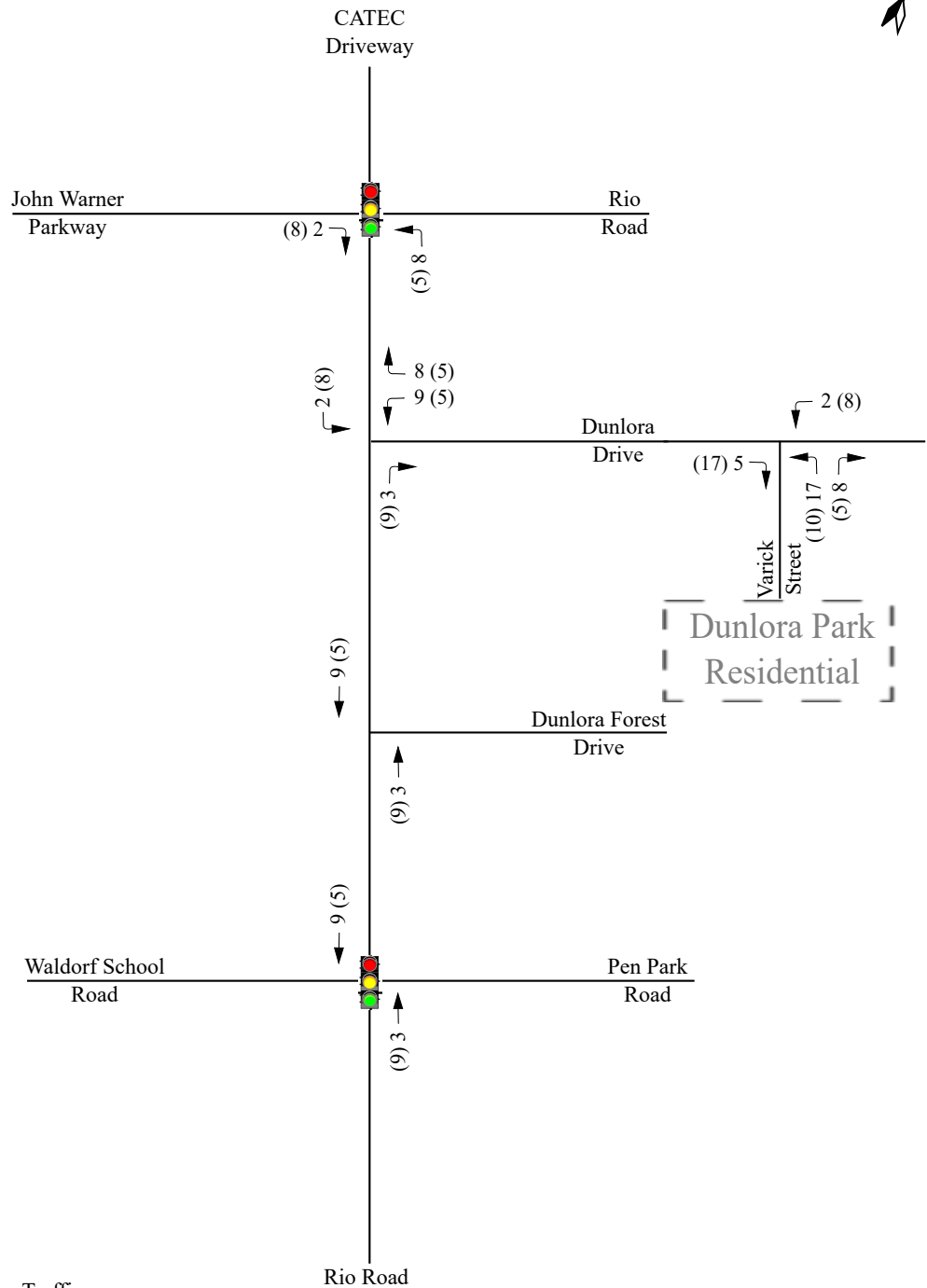


Rio Road Multi-Family
Albemarle County, Virginia

Dunlora Park Residential
Distribution

Scale: Not to Scale

Figure 7



LEGEND

X (Y) AM (PM) Peak Hour Traffic

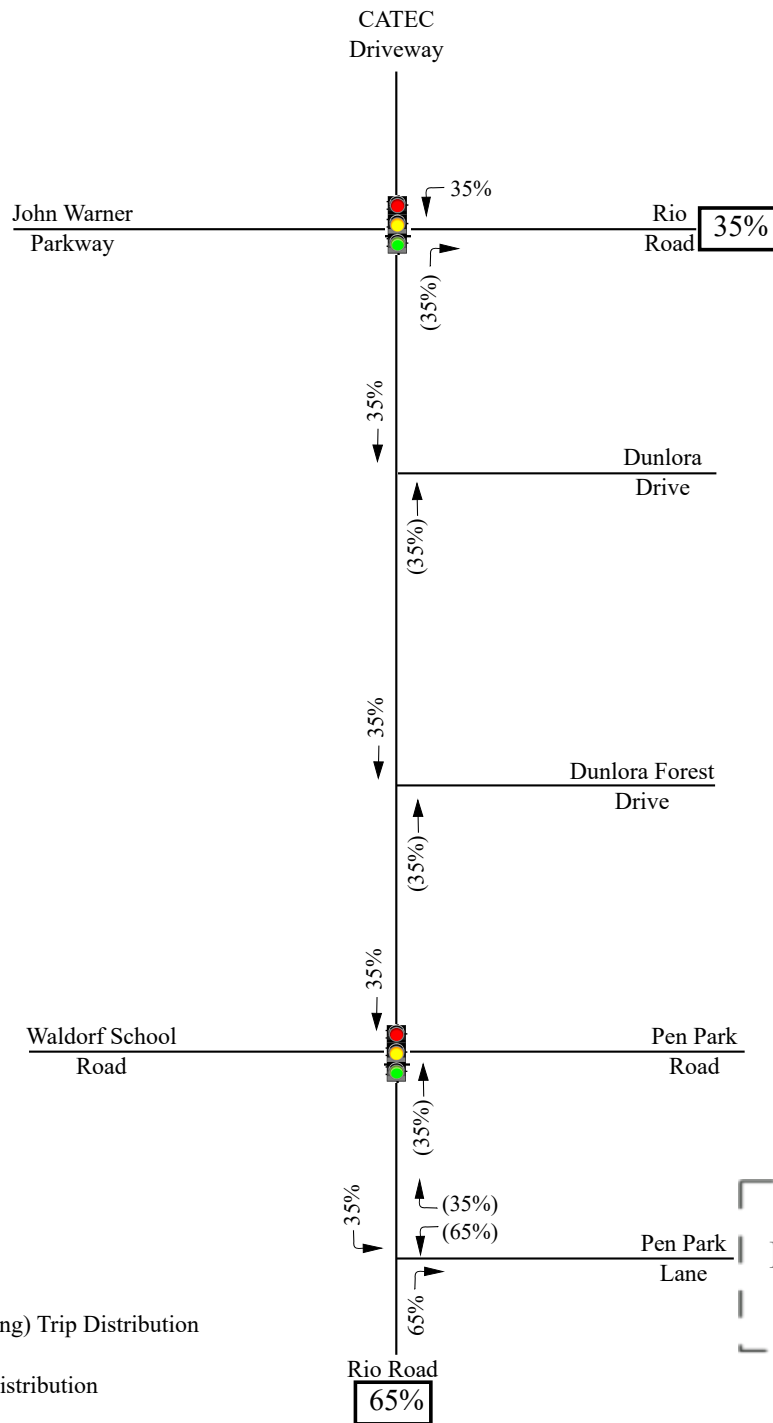


Rio Road Multi-Family
Albemarle County, Virginia

Dunlora Park Residential
Assignment

Scale: Not to Scale

Figure 8



LEGEND

X% (Y%) Entering (Exiting) Trip Distribution

XX% Regional Trip Distribution

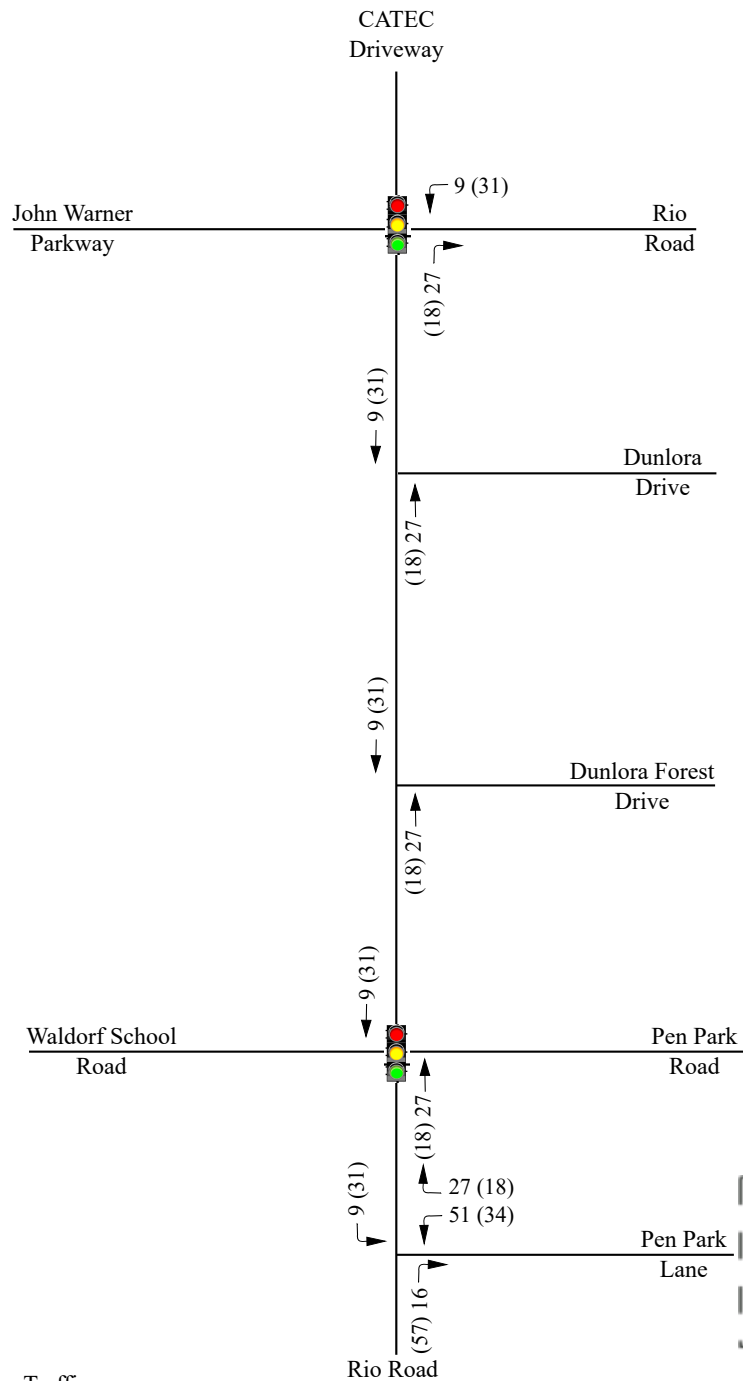


Rio Road Multi-Family
Albemarle County, Virginia

Lochlyn Hill Residential
Distribution

Scale: Not to Scale

Figure 9



LEGEND

X (Y) AM (PM) Peak Hour Traffic

Lochlyn Hill
Residential

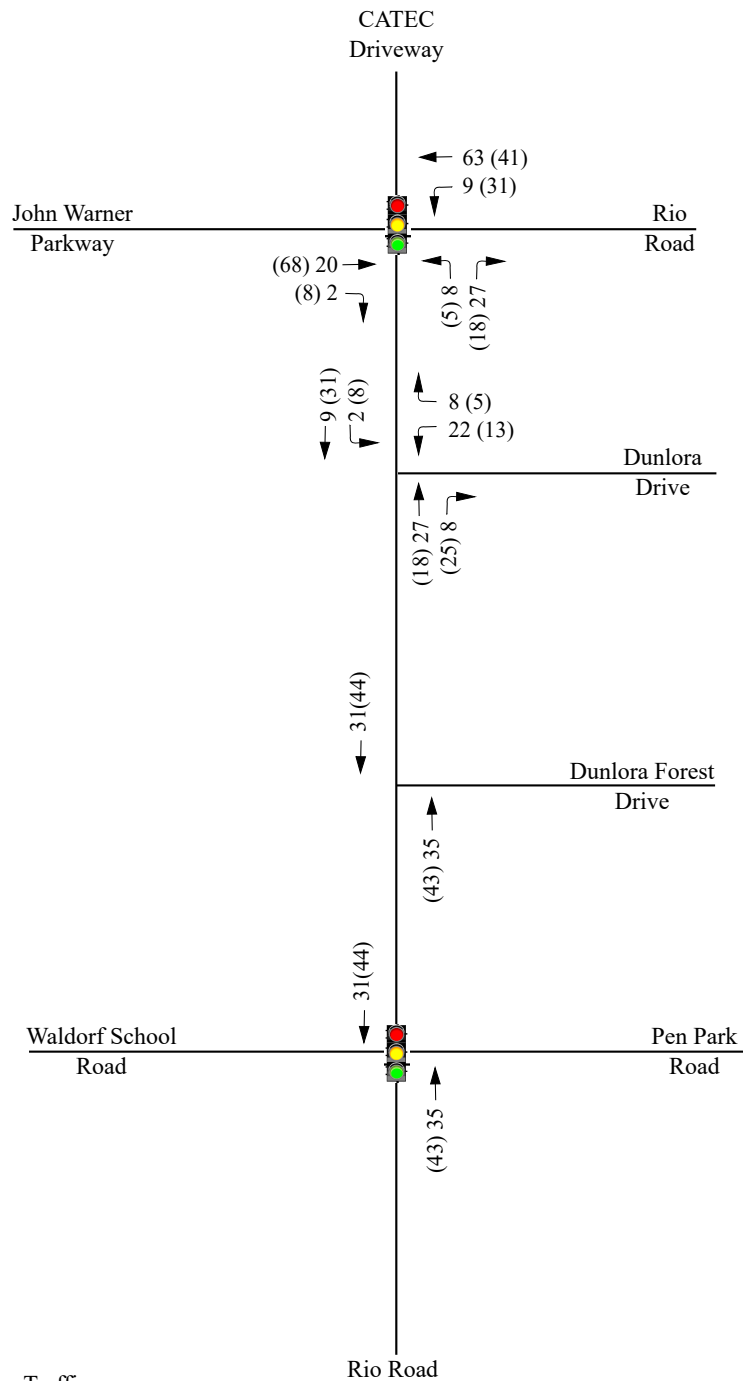


Rio Road Multi-Family
Albemarle County, Virginia

Lochlyn Hill Residential
Assignment

Scale: Not to Scale

Figure 10



LEGEND

X (Y) AM (PM) Peak Hour Traffic

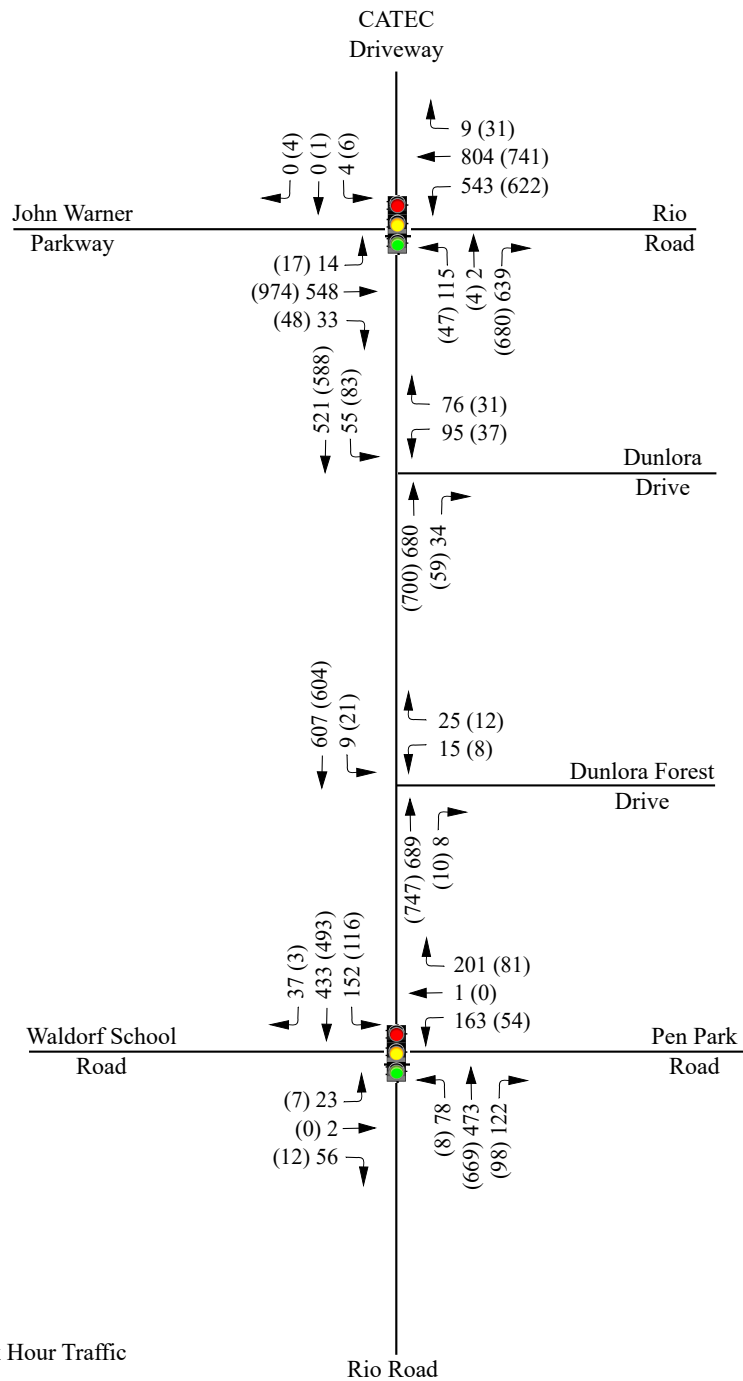


Rio Road Multi-Family
Albemarle County, Virginia

Total Approved
Development Volumes

Scale: Not to Scale

Figure 11



LEGEND

X (Y) AM (PM) Peak Hour Traffic

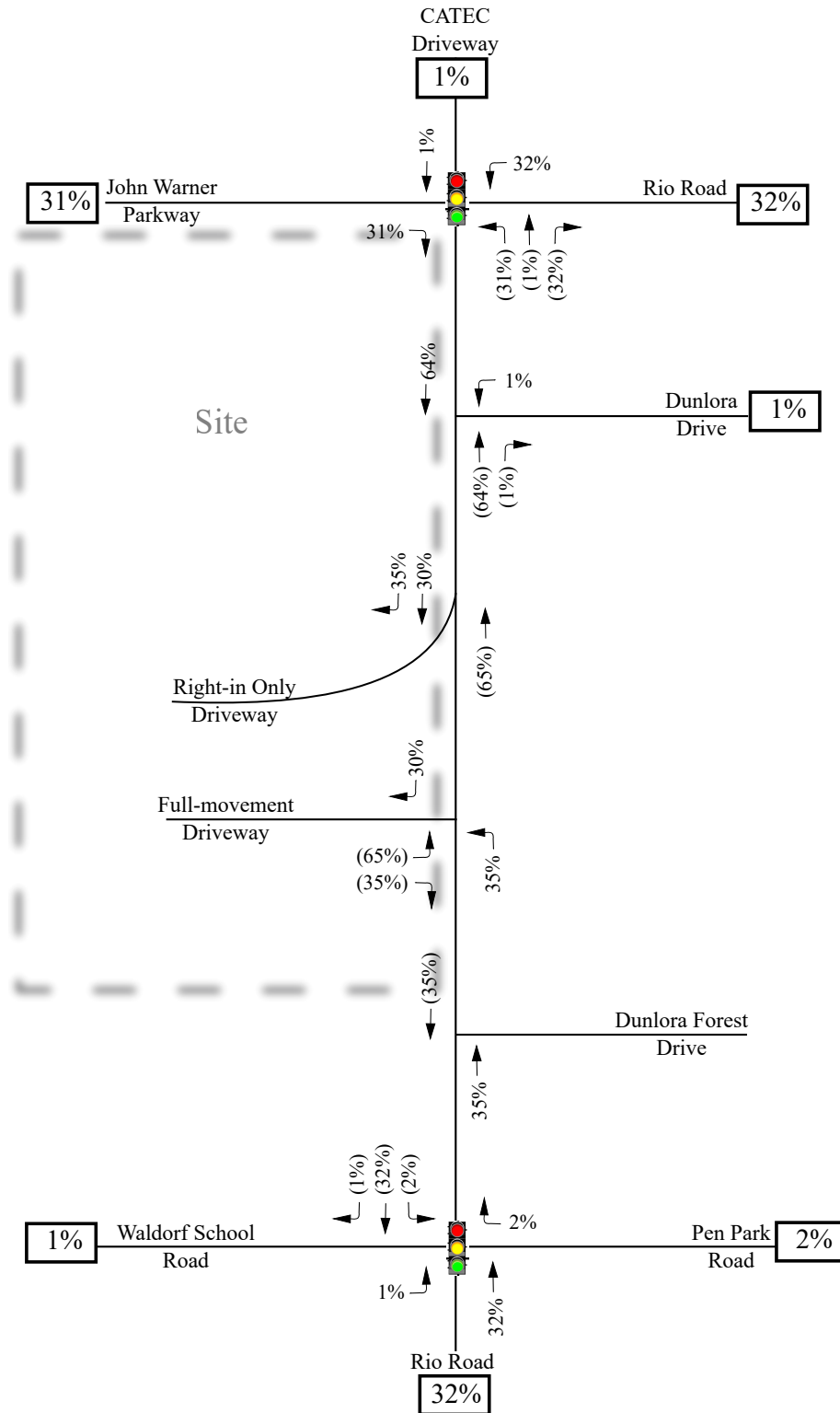


Rio Road Multi-Family
Albemarle County, Virginia

No-Build (2023)
Peak Hour Traffic Volumes

Scale: Not to Scale

Figure 12

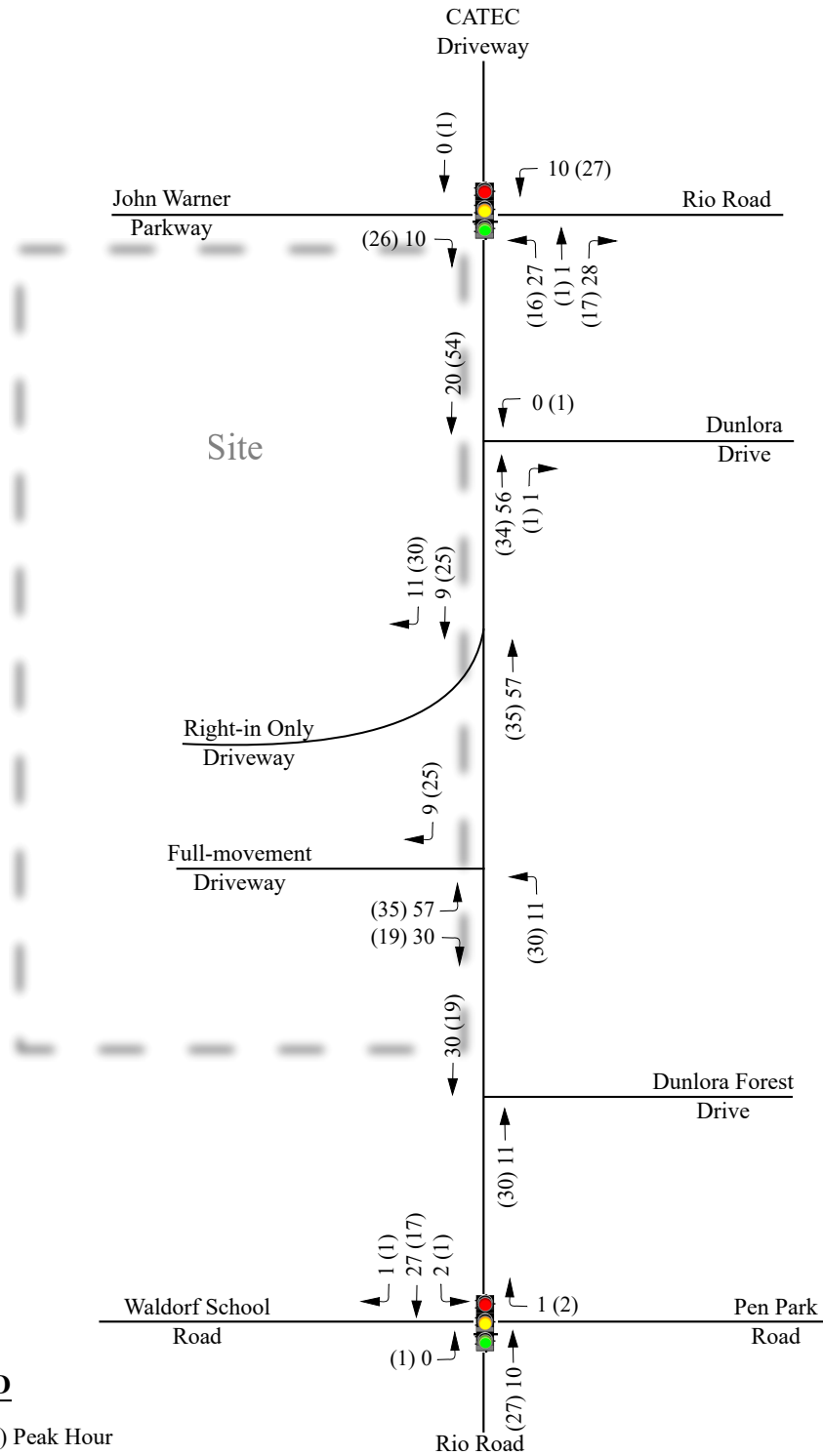


Rio Road Multi-Family
Albemarle County, Virginia

Site Trip Distribution

Scale: Not to Scale

Figure 13



LEGEND

X (Y) AM (PM) Peak Hour

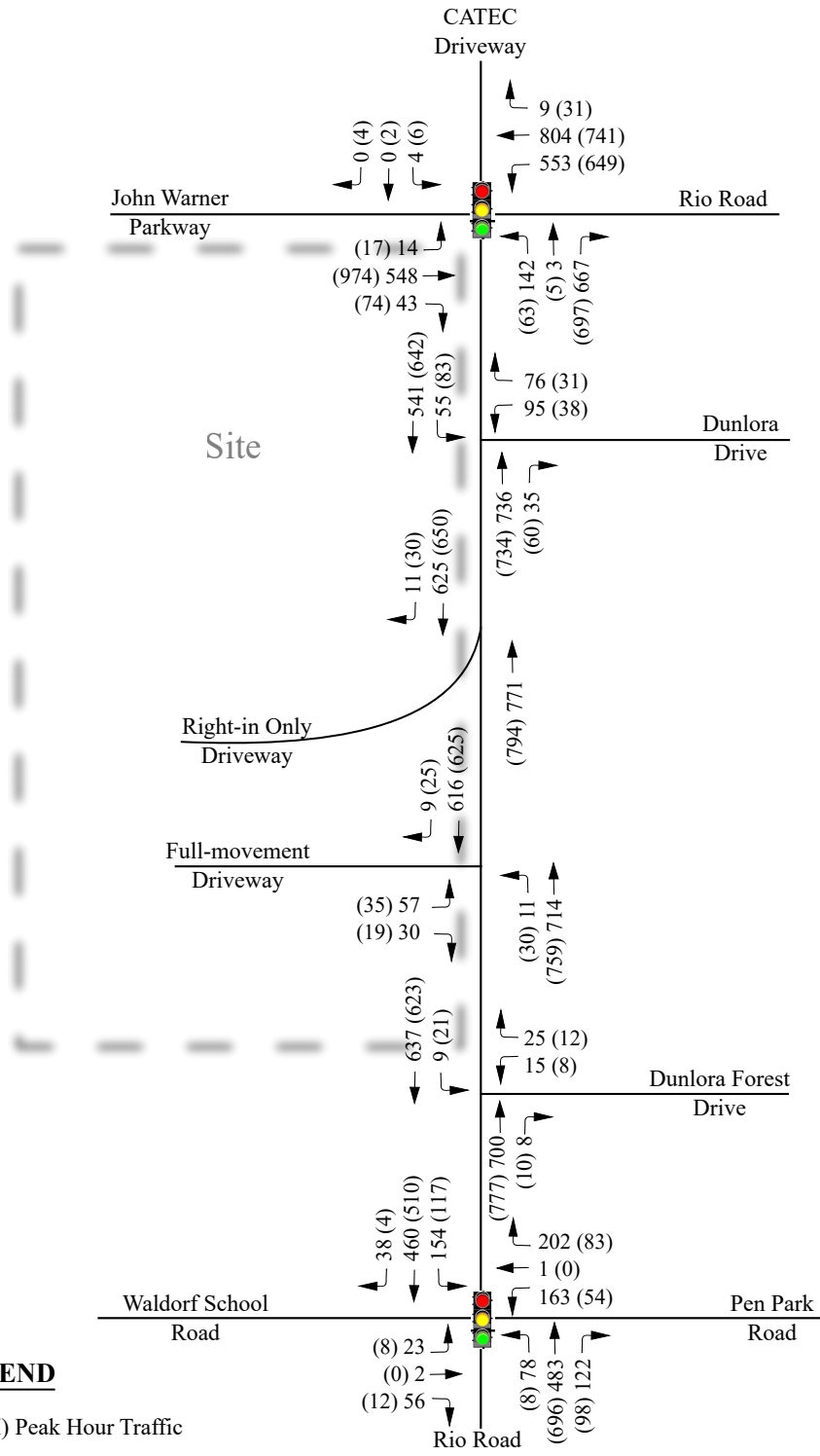


Rio Road Multi-Family
Albemarle County, Virginia

Site Trip Assignment

Scale: Not to Scale

Figure 14



LEGEND

X (Y) AM (PM) Peak Hour Traffic

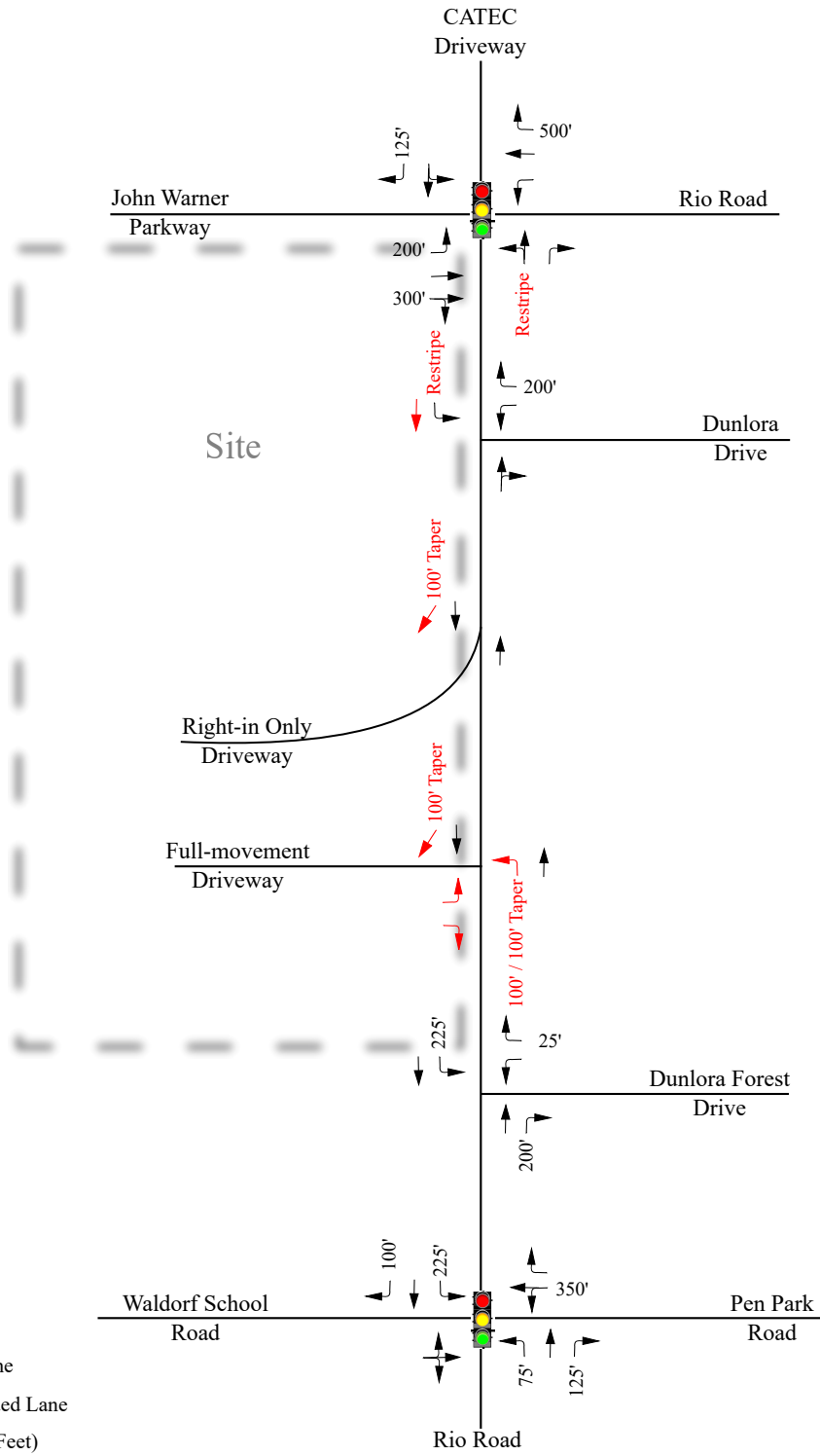


Rio Road Multi-Family
Albemarle County, Virginia

Build (2023) Peak Hour
Traffic Volumes

Scale: Not to Scale

Figure 15



LEGEND

- Existing Lane
- Recommended Lane
- X' Storage (In Feet)

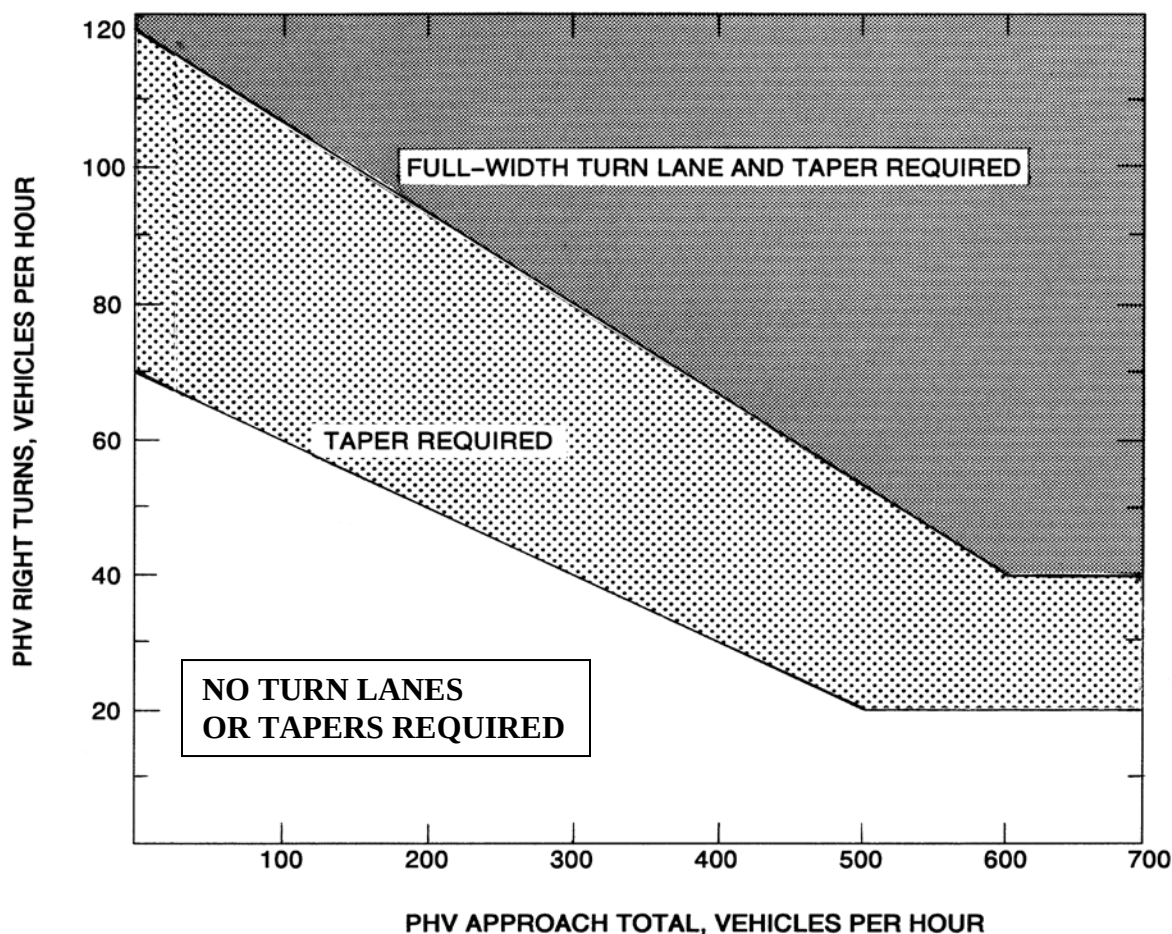


Rio Road Multi-Family
Albemarle County, Virginia

Recommended Lane
Configuration

Scale: Not to Scale

Figure 16



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

For posted speeds at or under 45 mph, PHV right turns > 40, and PHV total < 300.

Adjusted right turns = PHV Right Turns - 20

If PHV is not known use formula: $PHV = ADT \times K \times D$

K = the percent of AADT occurring in the peak hour

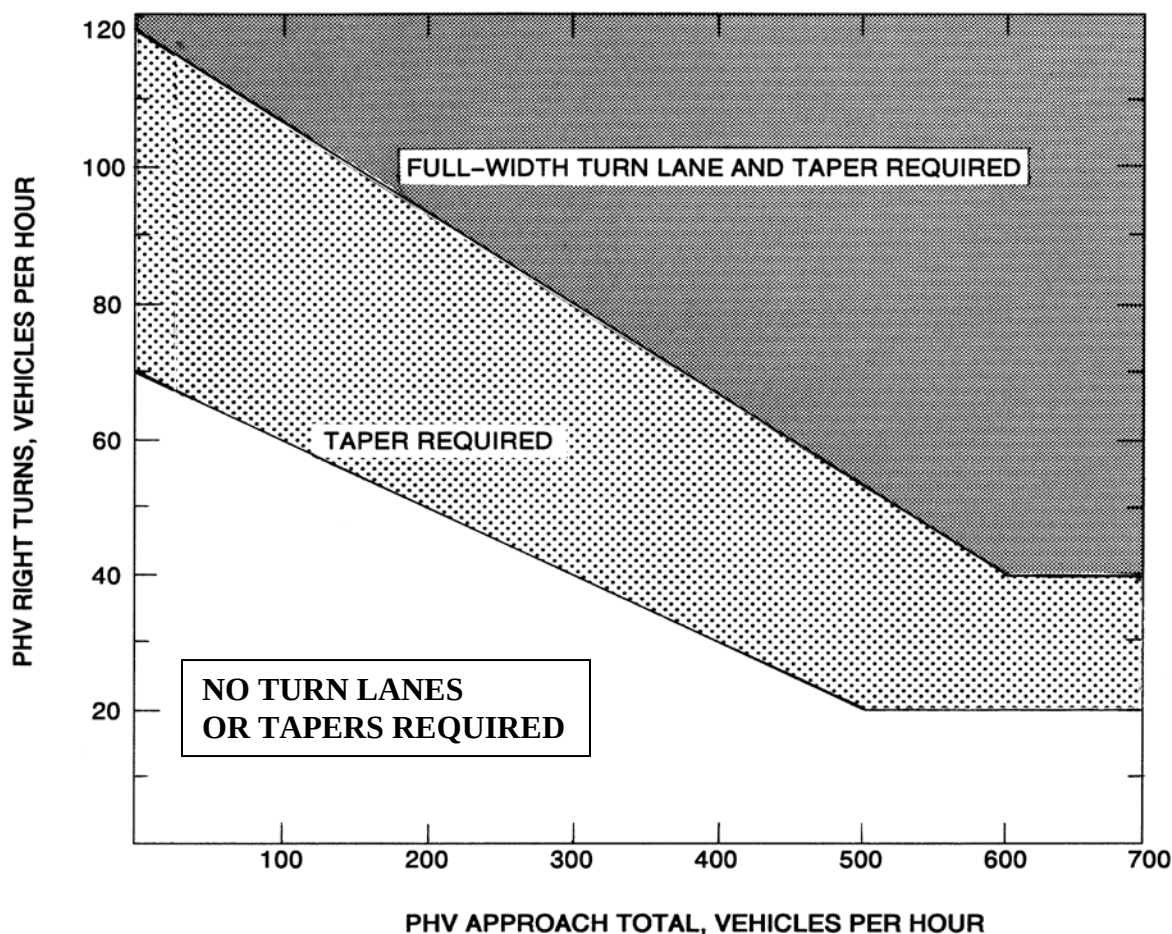
D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

When right turn facilities are warranted, see Figure 3-1 for design criteria.*

FIGURE 3-26 WARRANTS FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)

* Rev. 1/15



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

For posted speeds at or under 45 mph, PHV right turns > 40, and PHV total < 300.

Adjusted right turns = PHV Right Turns - 20

If PHV is not known use formula: $PHV = ADT \times K \times D$

K = the percent of AADT occurring in the peak hour

D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

When right turn facilities are warranted, see Figure 3-1 for design criteria.*

FIGURE 3-26 WARRANTS FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)

* Rev. 1/15

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAY

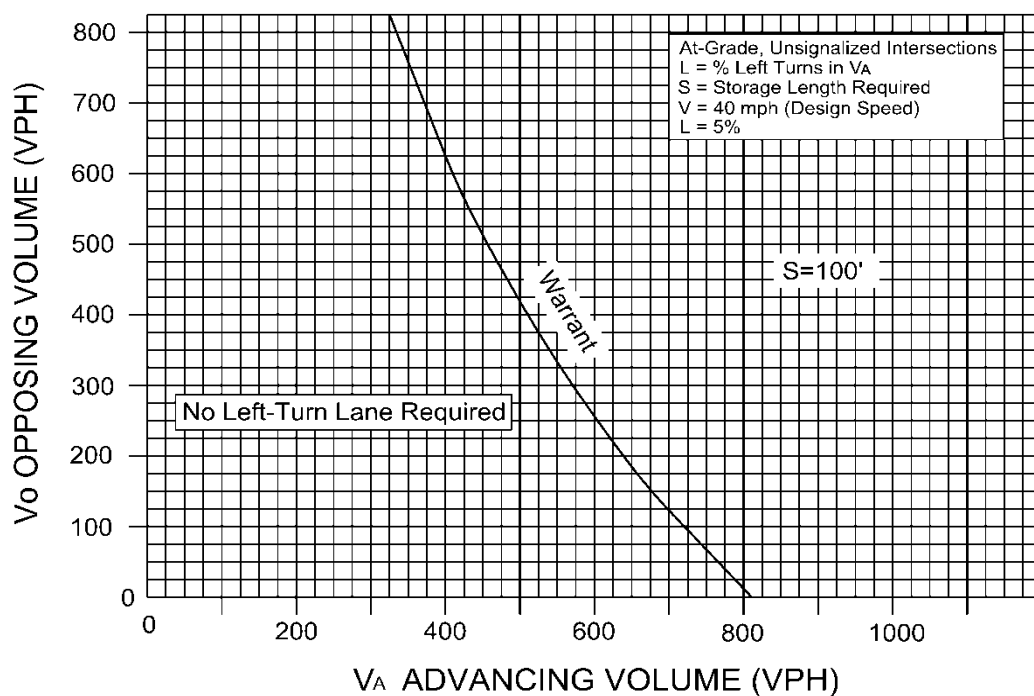


FIGURE 3-5

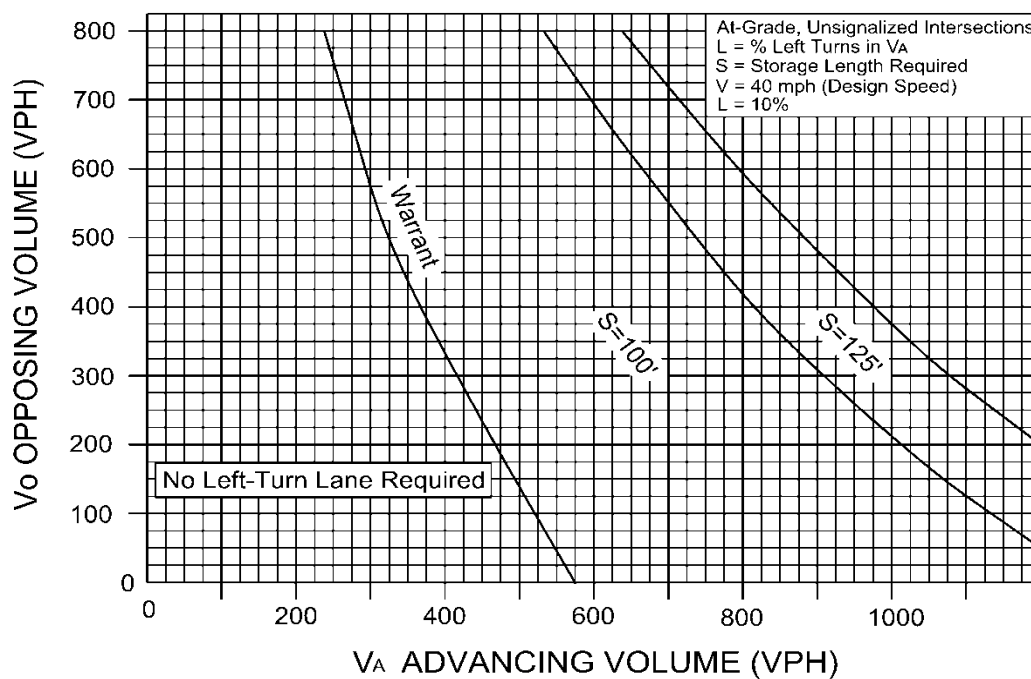


FIGURE 3-6

Burns Service Inc.

1202 Langdon Terrace Drive
Indian Trail, NC, 28079

We Count because YOU Count

File Name : Charlottesville(Rio and John W. Warner) AM Peak

Site Code :

Start Date : 8/29/2018

Page No : 1

Groups Printed- Cars + - Trucks

[illegible]

Burns Service Inc.

1202 Langdon Terrace Drive
Indian Trail, NC, 28079

We Count because YOU Count

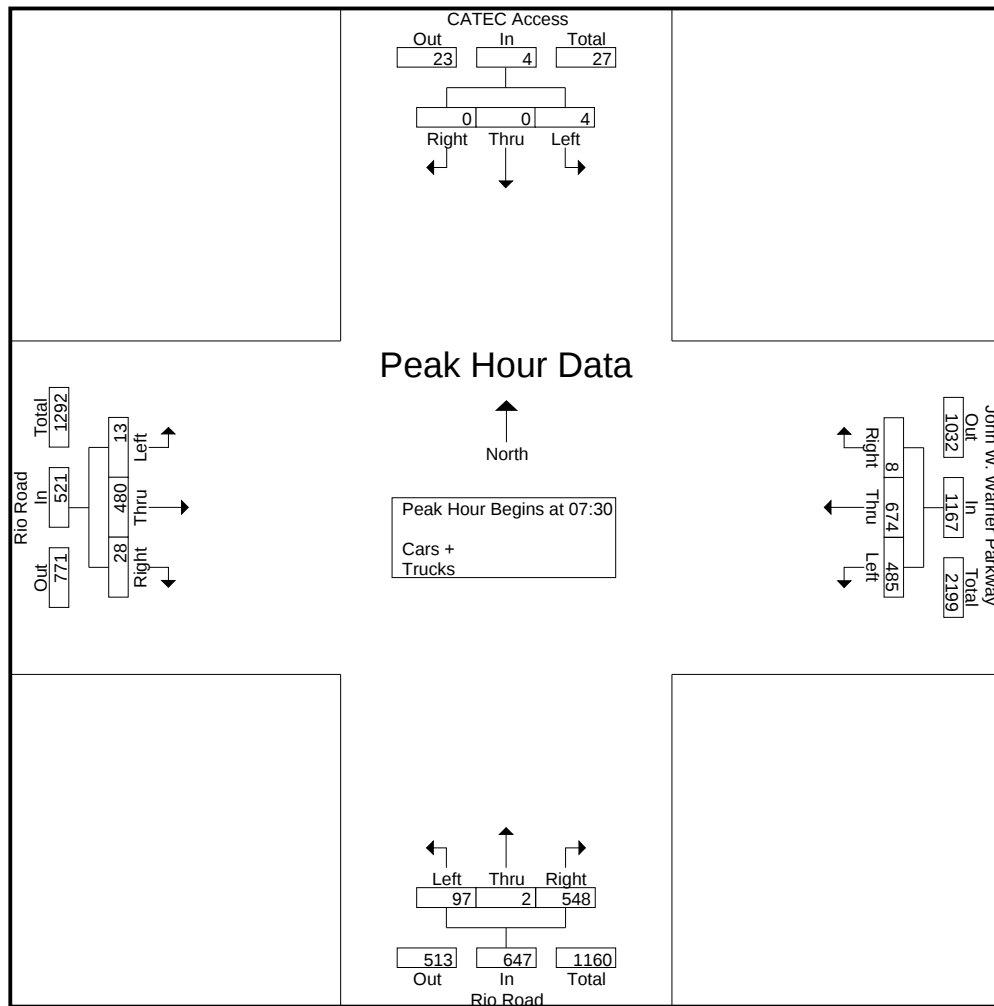
File Name : Charlottesville(Rio and John W. Warner) AM Peak

Site Code :

Start Date : 8/29/2018

Page No : 2

	CATEC Access Southbound				John W. Warner Parkway Westbound				Rio Road Northbound				Rio Road Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1 Peak Hour for Entire Intersection Begins at 07:30																	
07:30	0	0	0	0	2	168	112	282	137	0	32	169	7	118	0	125	576
07:45	0	0	0	0	1	181	164	346	142	0	19	161	9	126	6	141	648
08:00	0	0	3	3	1	153	112	266	140	1	24	165	10	101	5	116	550
08:15	0	0	1	1	4	172	97	273	129	1	22	152	2	135	2	139	565
Total Volume	0	0	4	4	8	674	485	1167	548	2	97	647	28	480	13	521	2339
% App. Total	0	0	100		0.7	57.8	41.6		84.7	0.3	15		5.4	92.1	2.5		
PHF	.000	.000	.333	.333	.500	.931	.739	.843	.965	.500	.758	.957	.700	.889	.542	.924	.902



Burns Service Inc.

1202 Langdon Terrace Drive
Indian Trail, NC, 28079

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File Name : Charlottesville(Rio and John W. Warner) PM Peak

Site Code :

Start Date : 8/29/2018

Page No : 1

Groups Printed- Cars + - Trucks

	CATEC Access Southbound					John W. Warner Parkway Westbound					Rio Road Northbound					Rio Road Eastbound					
Start Time	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Int. Total
16:00	3	1	2	0	6	3	145	119	0	267	111	0	7	0	118	8	186	2	1	197	588
16:15	4	0	2	0	6	3	137	124	0	264	132	0	7	0	139	7	199	1	1	208	617
16:30	2	0	1	0	3	5	145	143	0	293	130	1	9	0	140	7	183	3	0	193	629
16:45	1	1	1	0	3	2	159	125	0	286	151	0	9	0	160	6	205	3	0	214	663
Total	10	2	6	0	18	13	586	511	0	1110	524	1	32	0	557	28	773	9	2	812	2497
17:00	2	0	0	0	2	7	175	139	0	321	155	3	10	0	168	13	188	6	0	207	698
17:15	1	0	1	0	2	7	154	159	0	320	165	0	5	0	170	5	218	2	0	225	717
17:30	0	0	3	0	3	12	148	114	0	274	131	1	14	0	146	12	213	4	0	229	652
17:45	1	0	1	0	2	5	147	108	0	260	123	0	8	0	131	9	149	2	2	162	555
Total	4	0	5	0	9	31	624	520	0	1175	574	4	37	0	615	39	768	14	2	823	2622
Grand Total	14	2	11	0	27	44	1210	1031	0	2285	1098	5	69	0	1172	67	1541	23	4	1635	5119
Apprch %	51.9	7.4	40.7	0		1.9	53	45.1	0		93.7	0.4	5.9	0		4.1	94.3	1.4	0.2		
Total %	0.3	0	0.2	0	0.5	0.9	23.6	20.1	0	44.6	21.4	0.1	1.3	0	22.9	1.3	30.1	0.4	0.1	31.9	
Cars +	14	2	11	0	27	44	1210	1031	0	2285	1098	5	69	0	1172	67	1540	23	4	1634	5118
% Cars +	100	100	100	0	100	100	100	100	0	100	100	100	100	0	100	100	99.9	100	100	99.9	100
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0

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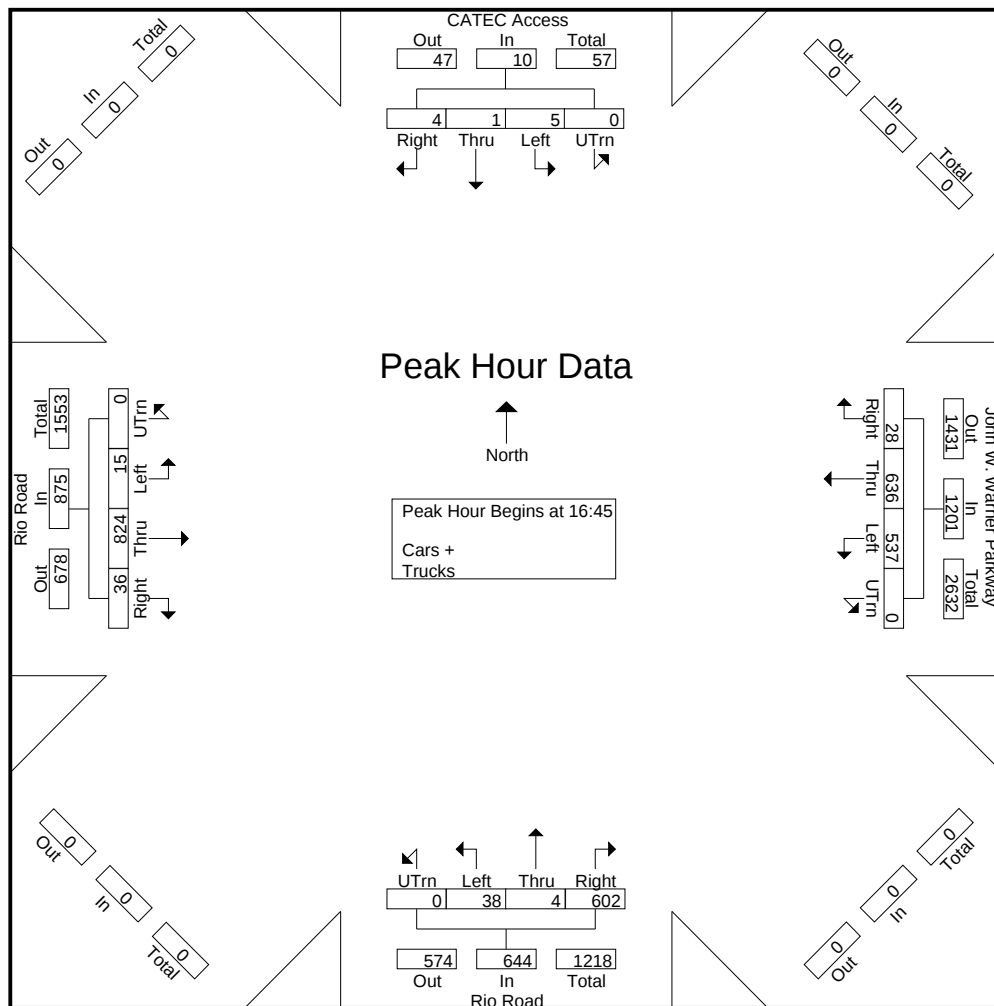
File Name : Charlottesville(Rio and John W. Warner) PM Peak

Site Code :

Start Date : 8/29/2018

Page No : 2

	CATEC Access Southbound					John W. Warner Parkway Westbound					Rio Road Northbound					Rio Road Eastbound					
Start Time	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Right	Thru	Left	UTrn	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:45																					
16:45	1	1	1	0	3	2	159	125	0	286	151	0	9	0	160	6	205	3	0	214	663
17:00	2	0	0	0	2	7	175	139	0	321	155	3	10	0	168	13	188	6	0	207	698
17:15	1	0	1	0	2	7	154	159	0	320	165	0	5	0	170	5	218	2	0	225	717
17:30	0	0	3	0	3	12	148	114	0	274	131	1	14	0	146	12	213	4	0	229	652
Total Volume	4	1	5	0	10	28	636	537	0	1201	602	4	38	0	644	36	824	15	0	875	2730
% App. Total																					
PHF	.500	.250	.417	.000	.833	.583	.909	.844	.000	.935	.912	.333	.679	.000	.947	.692	.945	.625	.000	.955	.952



Burns Service Inc.

1202 Langdon Terrace Drive
Indian Trail, NC, 28079

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File Name : Charlottesville(Rio and Dunlora) AM Peak

Site Code :

Start Date : 8/29/2018

Page No : 1

Groups Printed- Cars + - Trucks

	Rio Road Southbound			Dunlora Drive Westbound			Rio Road Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
07:00	48	5	53	7	5	12	4	60	64	129
07:15	61	6	67	14	7	21	1	88	89	177
07:30	117	5	122	22	10	32	1	149	150	304
07:45	127	15	142	9	29	38	10	159	169	349
Total	353	31	384	52	51	103	16	456	472	959
08:00	109	10	119	15	11	26	11	149	160	305
08:15	79	18	97	16	16	32	2	136	138	267
08:30	63	5	68	14	13	27	3	122	125	220
08:45	64	8	72	12	13	25	5	104	109	206
Total	315	41	356	57	53	110	21	511	532	998
Grand Total	668	72	740	109	104	213	37	967	1004	1957
Apprch %	90.3	9.7		51.2	48.8		3.7	96.3		
Total %	34.1	3.7	37.8	5.6	5.3	10.9	1.9	49.4	51.3	
Cars +	657	67	724	109	103	212	36	957	993	1929
% Cars +	98.4	93.1	97.8	100	99	99.5	97.3	99	98.9	98.6
Trucks	11	5	16	0	1	1	1	10	11	28
% Trucks	1.6	6.9	2.2	0	1	0.5	2.7	1	1.1	1.4

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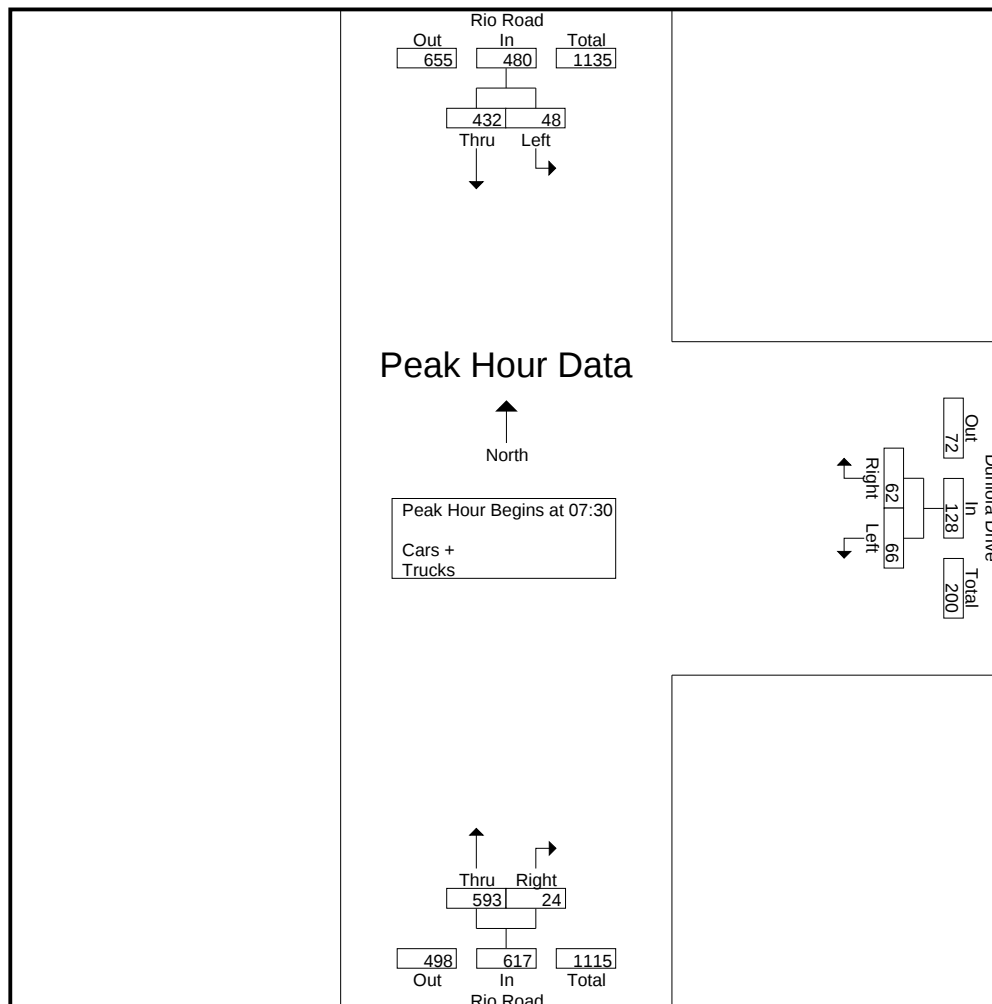
File Name : Charlottesville(Rio and Dunlora) AM Peak

Site Code :

Start Date : 8/29/2018

Page No : 2

	Rio Road Southbound			Dunlora Drive Westbound			Rio Road Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30										
07:30	117	5	122	22	10	32	1	149	150	304
07:45	127	15	142	9	29	38	10	159	169	349
08:00	109	10	119	15	11	26	11	149	160	305
08:15	79	18	97	16	16	32	2	136	138	267
Total Volume	432	48	480	62	66	128	24	593	617	1225
% App. Total	90	10		48.4	51.6		3.9	96.1		
PHF	.850	.667	.845	.705	.569	.842	.545	.932	.913	.878



Burns Service Inc.

1202 Langdon Terrace Drive
Indian Trail, NC, 28079

We Count because YOU Count

File Name : Charlottesville(Rio and Dunlora) PM Peak

Site Code :

Start Date : 8/29/2018

Page No : 1

Groups Printed- Cars + - Trucks

	Rio Road Southbound			Dunlora Drive Westbound			Rio Road Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
16:00	90	31	121	4	2	6	8	117	125	252
16:15	96	13	109	4	7	11	8	135	143	263
16:30	99	18	117	5	5	10	5	129	134	261
16:45	100	18	118	7	6	13	6	148	154	285
Total	385	80	465	20	20	40	27	529	556	1061
17:00	119	20	139	5	2	7	7	170	177	323
17:15	116	17	133	4	3	7	10	160	170	310
17:30	112	13	125	8	11	19	8	132	140	284
17:45	90	13	103	6	5	11	6	116	122	236
Total	437	63	500	23	21	44	31	578	609	1153
Grand Total	822	143	965	43	41	84	58	1107	1165	2214
Apprch %	85.2	14.8		51.2	48.8		5	95		
Total %	37.1	6.5	43.6	1.9	1.9	3.8	2.6	50	52.6	
Cars +	815	138	953	43	41	84	58	1103	1161	2198
% Cars +	99.1	96.5	98.8	100	100	100	100	99.6	99.7	99.3
Trucks	7	5	12	0	0	0	0	4	4	16
% Trucks	0.9	3.5	1.2	0	0	0	0	0.4	0.3	0.7

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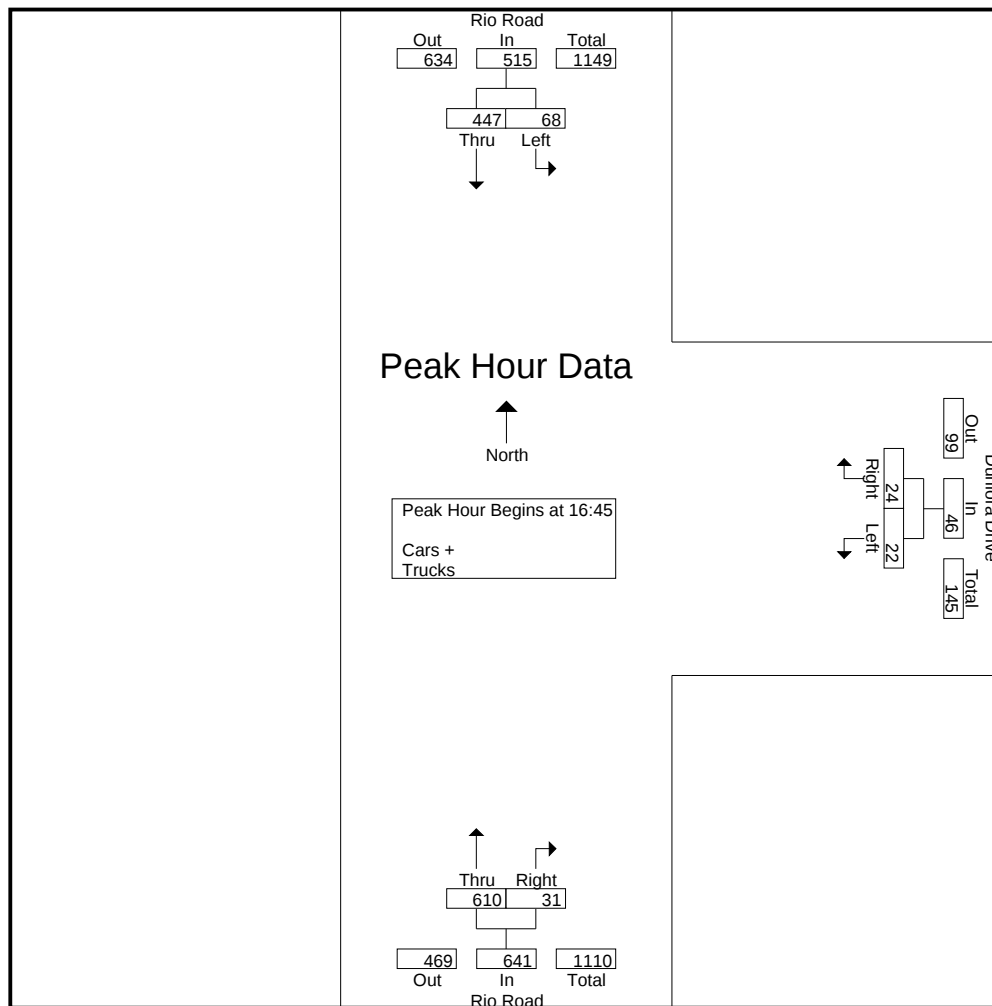
File Name : Charlottesville(Rio and Dunlora) PM Peak

Site Code :

Start Date : 8/29/2018

Page No : 2

	Rio Road Southbound			Dunlora Drive Westbound			Rio Road Northbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:45										
16:45	100	18	118	7	6	13	6	148	154	285
17:00	119	20	139	5	2	7	7	170	177	323
17:15	116	17	133	4	3	7	10	160	170	310
17:30	112	13	125	8	11	19	8	132	140	284
Total Volume	447	68	515	24	22	46	31	610	641	1202
% App. Total	86.8	13.2		52.2	47.8		4.8	95.2		
PHF	.939	.850	.926	.750	.500	.605	.775	.897	.905	.930



Ramey Kemp & Associates

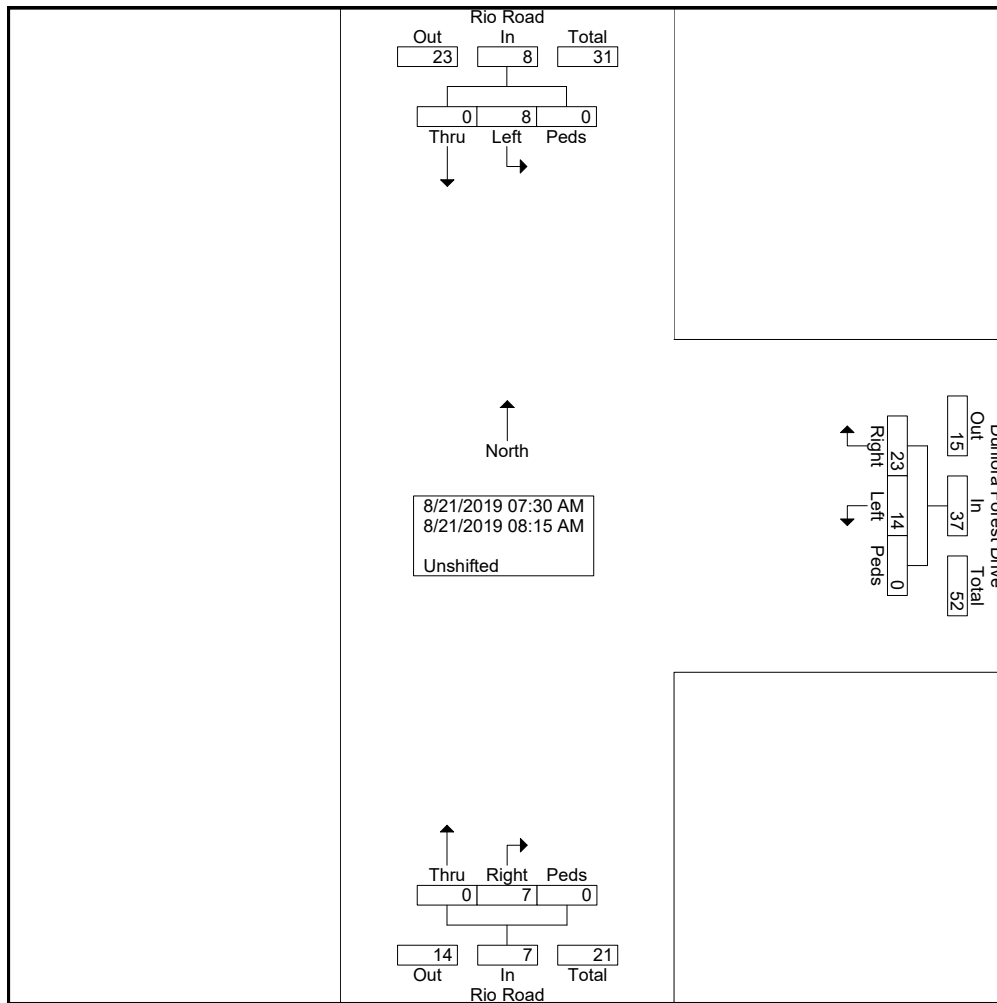
4343 Cox Road
Glen Allen, VA 23060

Counted By: Rupinski
Weather: Clear
Equipment ID: 4792

File Name : Dunlora Forest Drive AM
Site Code : 00000001
Start Date : 8/21/2019
Page No : 1

Groups Printed- Unshifted

	Rio Road From North				Dunlora Forest Drive From East				Rio Road From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
07:30 AM	0	3	0	3	11	4	0	15	2	0	0	2	20
07:45 AM	0	2	0	2	4	5	0	9	0	0	0	0	11
Total	0	5	0	5	15	9	0	24	2	0	0	2	31
08:00 AM	0	3	0	3	2	3	0	5	3	0	0	3	11
08:15 AM	0	0	0	0	6	2	0	8	2	0	0	2	10
Grand Total	0	8	0	8	23	14	0	37	7	0	0	7	52
Apprch %	0	100	0		62.2	37.8	0		100	0	0		
Total %	0	15.4	0	15.4	44.2	26.9	0	71.2	13.5	0	0	13.5	



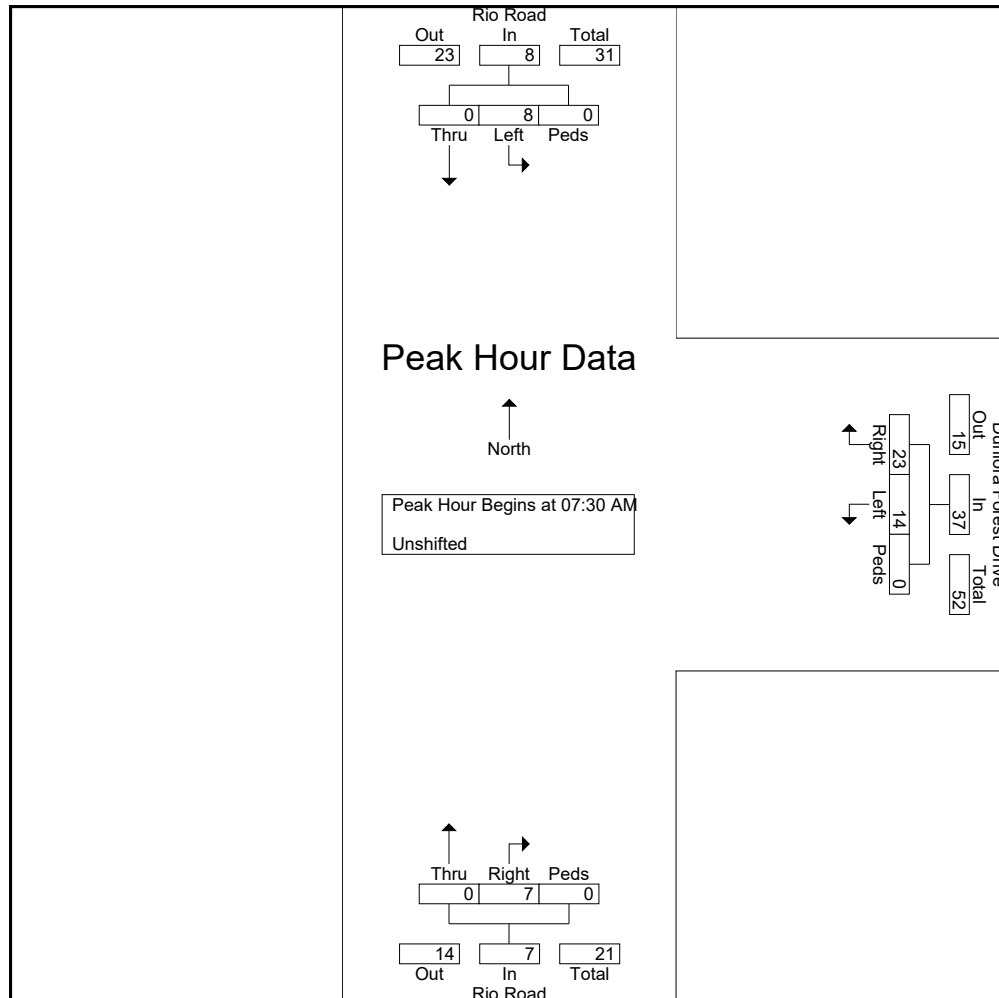
Ramey Kemp & Associates

4343 Cox Road
Glen Allen, VA 23060

Counted By: Rupinski
Weather: Clear
Equipment ID: 4792

File Name : Dunlora Forest Drive AM
Site Code : 00000001
Start Date : 8/21/2019
Page No : 2

	Rio Road From North				Dunlora Forest Drive From East				Rio Road From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	0	3	0	3	11	4	0	15	2	0	0	2	20
07:45 AM	0	2	0	2	4	5	0	9	0	0	0	0	11
08:00 AM	0	3	0	3	2	3	0	5	3	0	0	3	11
08:15 AM	0	0	0	0	6	2	0	8	2	0	0	2	10
Total Volume	0	8	0	8	23	14	0	37	7	0	0	7	52
% App. Total	0	100	0		62.2	37.8	0		100	0	0		
PHF	.000	.667	.000	.667	.523	.700	.000	.617	.583	.000	.000	.583	.650



Ramey Kemp & Associates

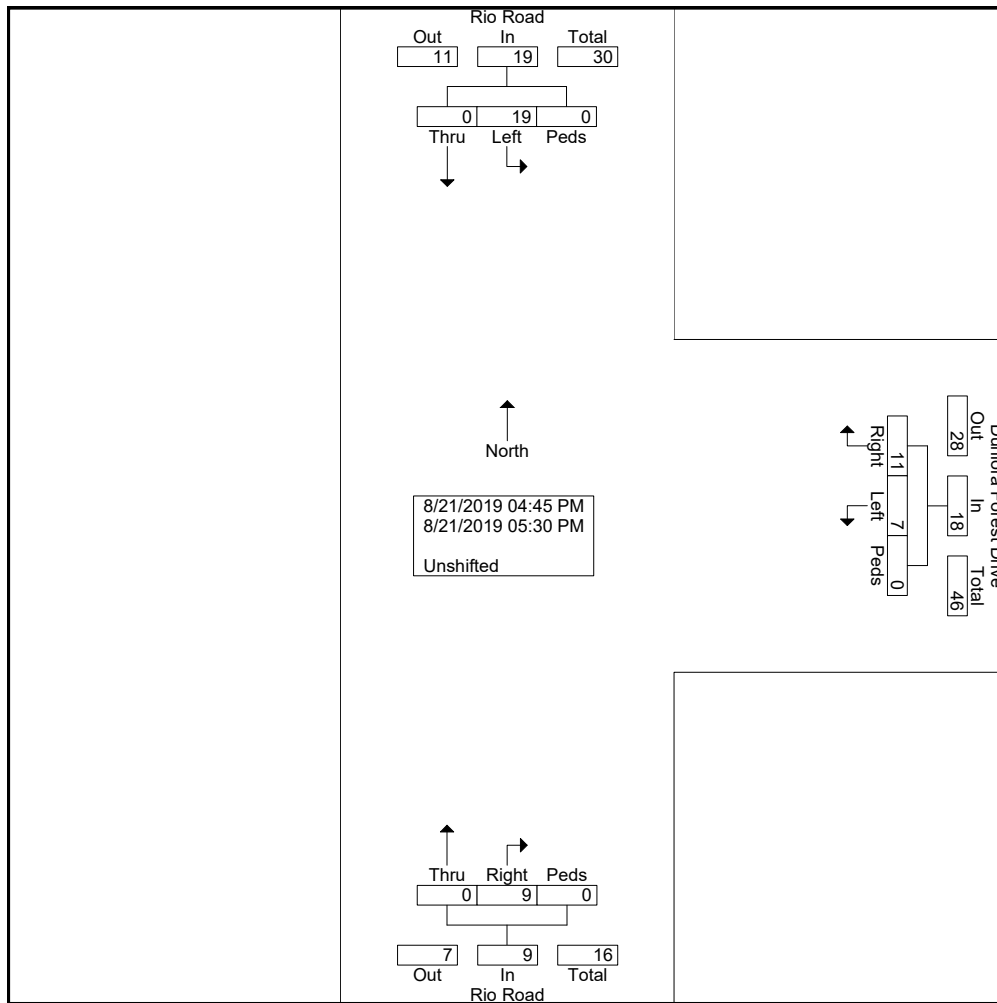
4343 Cox Road
Glen Allen, VA 23060

Counted By: Lee
Weather: Clear
Equipment ID: 4792

File Name : Dunlora Forest Drive PM
Site Code : 00000007
Start Date : 8/21/2019
Page No : 1

Groups Printed- Unshifted

	Rio Road From North				Dunlora Forest Drive From East				Rio Road From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
04:45 PM	0	3	0	3	2	2	0	4	1	0	0	1	8
Total	0	3	0	3	2	2	0	4	1	0	0	1	8
05:00 PM	0	5	0	5	1	3	0	4	1	0	0	1	10
05:15 PM	0	6	0	6	3	1	0	4	5	0	0	5	15
05:30 PM	0	5	0	5	5	1	0	6	2	0	0	2	13
Grand Total	0	19	0	19	11	7	0	18	9	0	0	9	46
Apprch %	0	100	0		61.1	38.9	0		100	0	0		
Total %	0	41.3	0	41.3	23.9	15.2	0	39.1	19.6	0	0	19.6	



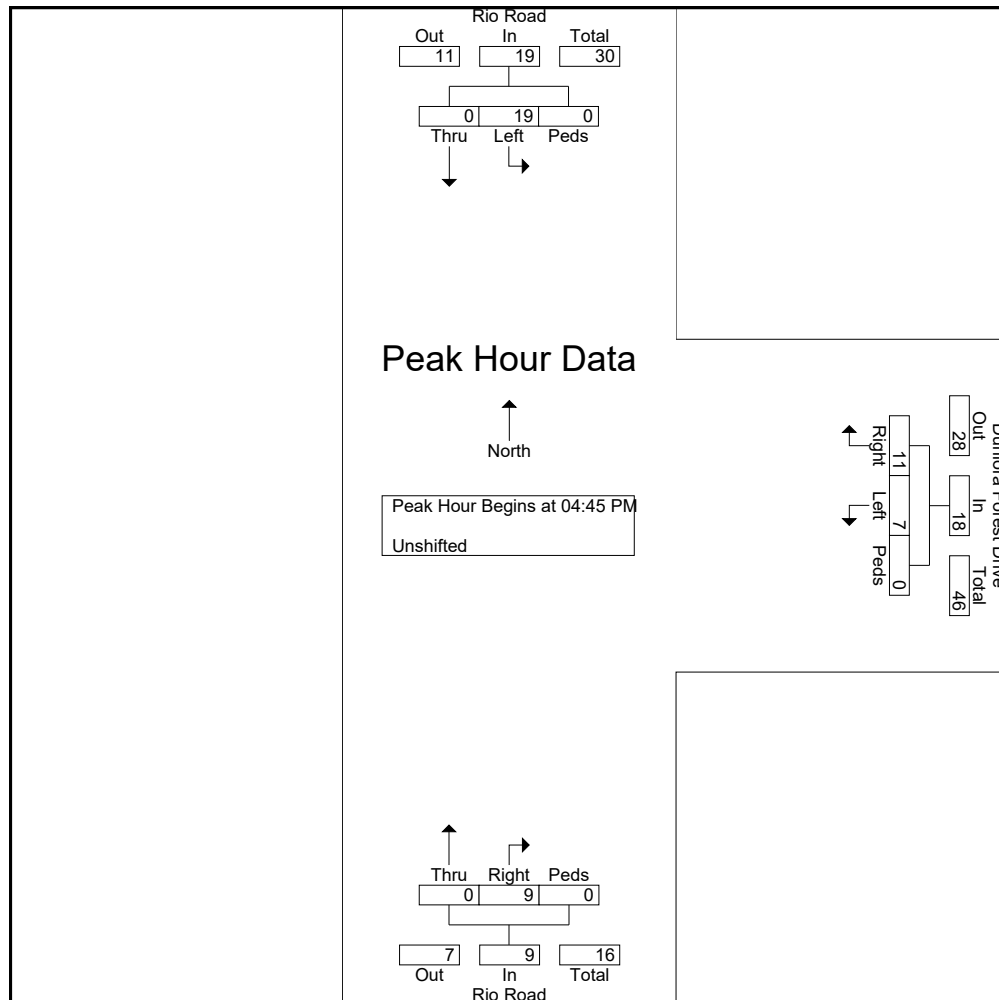
Ramey Kemp & Associates

4343 Cox Road
Glen Allen, VA 23060

Counted By: Lee
Weather: Clear
Equipment ID: 4792

File Name : Dunlora Forest Drive PM
Site Code : 00000007
Start Date : 8/21/2019
Page No : 2

	Rio Road From North				Dunlora Forest Drive From East				Rio Road From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:45 PM to 05:30 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:45 PM													
04:45 PM	0	3	0	3	2	2	0	4	1	0	0	1	8
05:00 PM	0	5	0	5	1	3	0	4	1	0	0	1	10
05:15 PM	0	6	0	6	3	1	0	4	5	0	0	5	15
05:30 PM	0	5	0	5	5	1	0	6	2	0	0	2	13
Total Volume	0	19	0	19	11	7	0	18	9	0	0	9	46
% App. Total	0	100	0		61.1	38.9	0		100	0	0		
PHF	.000	.792	.000	.792	.550	.583	.000	.750	.450	.000	.000	.450	.767



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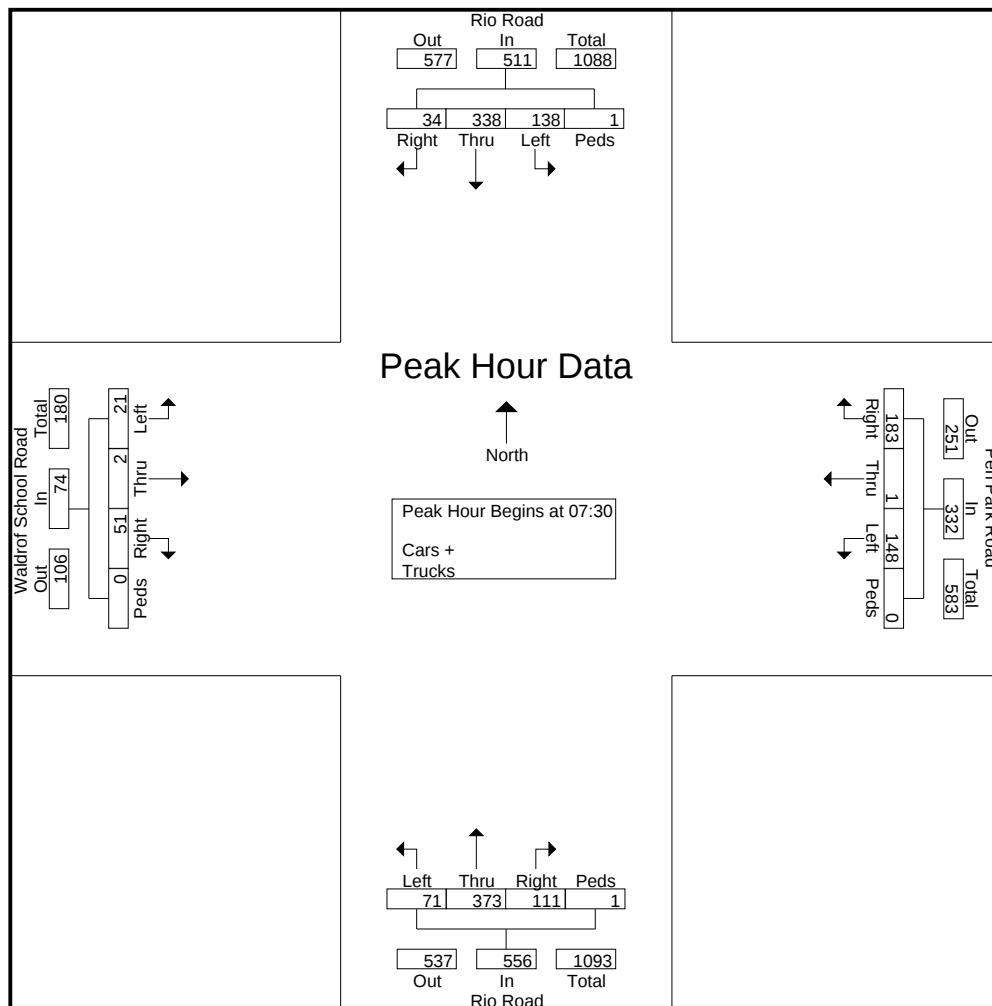
File Name : Charlottesville(Rio and Pen Park) AM Peak

Site Code :

Start Date : 8/29/2018

Page No : 2

	Rio Road Southbound					Pen Park Road Westbound					Rio Road Northbound					Waldrof School Road Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	5	67	39	0	111	46	0	31	0	77	36	88	8	0	132	2	1	0	0	3	323
07:45	13	95	71	0	179	65	1	54	0	120	48	87	26	0	161	8	1	5	0	14	474
08:00	11	81	18	1	111	54	0	45	0	99	18	90	28	1	137	27	0	9	0	36	383
08:15	5	95	10	0	110	18	0	18	0	36	9	108	9	0	126	14	0	7	0	21	293
Total Volume	34	338	138	1	511	183	1	148	0	332	111	373	71	1	556	51	2	21	0	74	1473
% App. Total																					
PHF	.654	.889	.486	.250	.714	.704	.250	.685	.000	.692	.578	.863	.634	.250	.863	.472	.500	.583	.000	.514	.777



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Indian Trail, NC, 28079
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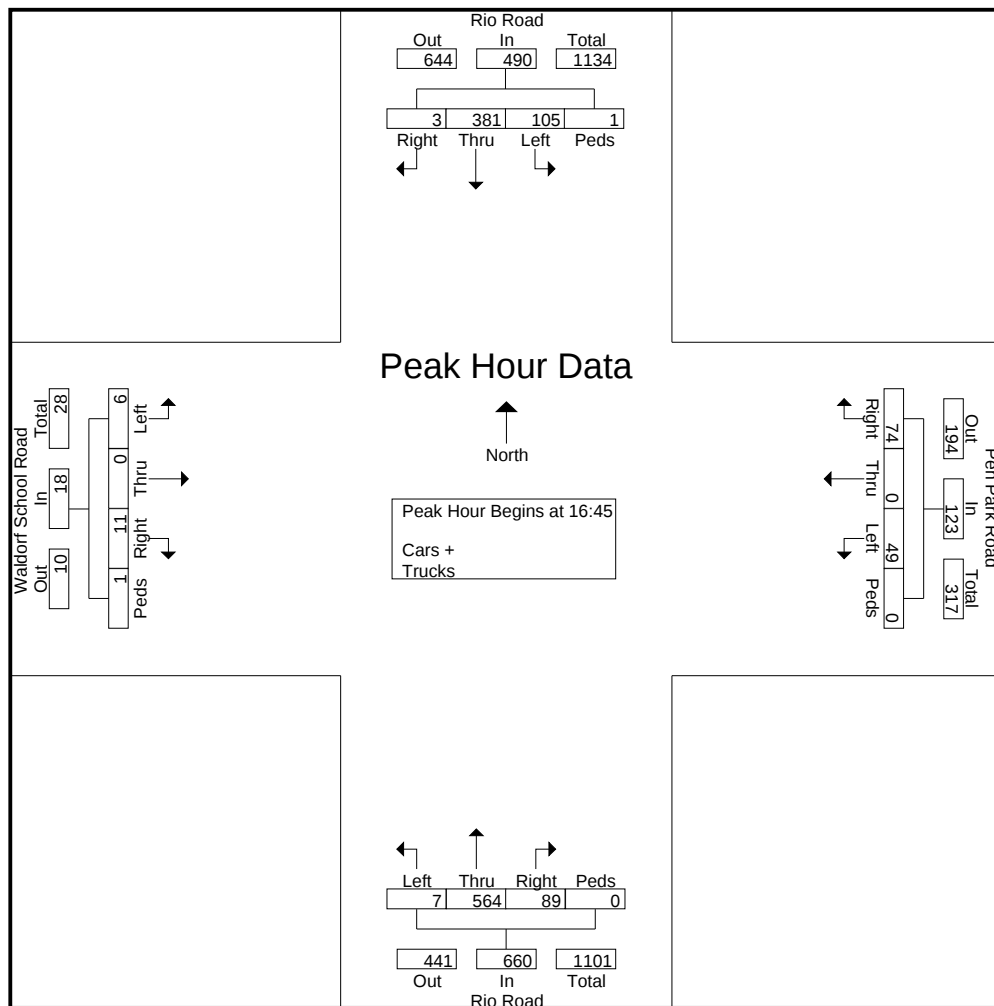
File Name : Charlottesville(Rio and Pen Park) PM Peak

Site Code :

Start Date : 8/29/2018

Page No : 2

	Rio Road Southbound					Pen Park Road Westbound					Rio Road Northbound					Waldorf School Road Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:45																					
16:45	0	99	23	0	122	23	0	15	0	38	16	129	0	0	145	0	0	1	0	1	306
17:00	1	100	29	0	130	18	0	14	0	32	22	161	4	0	187	2	0	1	1	4	353
17:15	2	93	29	1	125	19	0	15	0	34	24	148	3	0	175	8	0	3	0	11	345
17:30	0	89	24	0	113	14	0	5	0	19	27	126	0	0	153	1	0	1	0	2	287
Total Volume	3	381	105	1	490	74	0	49	0	123	89	564	7	0	660	11	0	6	1	18	1291
% App. Total																					
PHF	.375	.953	.905	.250	.942	.804	.000	.817	.000	.809	.824	.876	.438	.000	.882	.344	.000	.500	.250	.409	.914



Rio Road Multi-Family - Albemarle County, VA
1: Rio Road & John Warner Parkway & CATEC Driveway

Existing (2018) Conditions
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 										
Traffic Volume (veh/h)	13	480	28	485	674	8	97	2	556	4	1	1
Future Volume (veh/h)	13	480	28	485	674	8	97	2	556	4	1	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	14	533	31	539	749	9	108	2	618	4	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	24	1423	83	567	1350	1155	196	4	682	10	3	11
Arrive On Green	0.01	0.42	0.42	0.32	0.72	0.72	0.11	0.11	0.11	0.01	0.01	0.01
Sat Flow, veh/h	1781	3413	198	1781	1870	1585	1750	32	1585	1439	360	1585
Grp Volume(v), veh/h	14	277	287	539	749	9	110	0	618	5	0	1
Grp Sat Flow(s),veh/h/ln	1781	1777	1835	1781	1870	1585	1783	0	1585	1798	0	1585
Q Serve(g_s), s	1.5	20.8	20.9	57.1	35.9	0.3	11.3	0.0	21.6	0.5	0.0	0.1
Cycle Q Clear(g_c), s	1.5	20.8	20.9	57.1	35.9	0.3	11.3	0.0	21.6	0.5	0.0	0.1
Prop In Lane	1.00		0.11	1.00		1.00	0.98		1.00	0.80		1.00
Lane Grp Cap(c), veh/h	24	741	765	567	1350	1155	200	0	682	13	0	11
V/C Ratio(X)	0.57	0.37	0.38	0.95	0.55	0.01	0.55	0.00	0.91	0.39	0.00	0.09
Avail Cap(c_a), veh/h	78	741	765	723	1350	1155	200	0	682	97	0	85
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	94.6	38.9	38.9	64.3	12.5	7.1	81.1	0.0	51.4	95.4	0.0	95.2
Incr Delay (d2), s/veh	19.6	1.4	1.4	19.7	0.5	0.0	3.2	0.0	15.9	18.2	0.0	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	14.6	15.0	37.8	21.3	0.2	9.2	0.0	39.9	0.6	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	114.2	40.3	40.3	84.0	13.0	7.1	84.3	0.0	67.3	113.6	0.0	98.5
LnGrp LOS	F	D	D	F	B	A	F	A	E	F	A	F
Approach Vol, veh/h		578			1297			728			6	
Approach Delay, s/veh		42.1			42.5			69.9			111.1	
Approach LOS		D			D			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	68.1	85.9		30.0	9.2	144.8		9.0				
Change Period (Y+Rc), s	* 6.7	* 5.5		* 8.4	6.6	* 5.5		7.6				
Max Green Setting (Gmax), s	* 78	* 55		* 22	8.4	* 1.2E2		10.4				
Max Q Clear Time (g_c+I1), s	59.1	22.9		23.6	3.5	37.9		2.5				
Green Ext Time (p_c), s	2.3	6.7		0.0	0.0	13.8		0.0				

Intersection Summary

HCM 6th Ctrl Delay 50.2
HCM 6th LOS D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Multi-Family - Albemarle County, VA
2: Rio Road & Dunlora Drive

Existing (2018) Conditions
Timing Plan: AM Peak Hour

Intersection

Int Delay, s/veh 3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	66	62	593	24	48	465
Future Vol, veh/h	66	62	593	24	48	465
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	200	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	75	70	674	27	55	528

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1326	688	0
Stage 1	688	-	-
Stage 2	638	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	172	446	-
Stage 1	499	-	-
Stage 2	526	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	162	446	-
Mov Cap-2 Maneuver	162	-	-
Stage 1	499	-	-
Stage 2	494	-	-

Approach	WB	NB	SB
HCM Control Delay, s	30.3	0	0.9
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	162	446	896	-
HCM Lane V/C Ratio	-	-	0.463	0.158	0.061	-
HCM Control Delay (s)	-	-	45.1	14.6	9.3	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	2.2	0.6	0.2	-

Rio Road Multi-Family - Albemarle County, VA
3: Rio Road & Dunlora Forest Drive

Existing (2018) Conditions
Timing Plan: AM Peak Hour

Intersection

Int Delay, s/veh 0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	23	594	7	8	523
Future Vol, veh/h	14	23	594	7	8	523
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	26	660	8	9	581

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1259	660	0
Stage 1	660	-	-
Stage 2	599	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	188	463	-
Stage 1	514	-	-
Stage 2	549	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	186	463	-
Mov Cap-2 Maneuver	186	-	-
Stage 1	514	-	-
Stage 2	544	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.1	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	186	463	922	-
HCM Lane V/C Ratio	-	-	0.084	0.055	0.01	-
HCM Control Delay (s)	-	-	26.1	13.2	8.9	-
HCM Lane LOS	-	-	D	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.2	0	-

Rio Road Multi-Family - Albemarle County, VA
4: Rio Road & Waldorf School Road/Pen Park Road

Existing (2018) Conditions
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	2	51	148	1	183	71	397	111	138	365	34
Future Volume (veh/h)	21	2	51	148	1	183	71	397	111	138	365	34
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	27	3	65	190	1	235	91	509	142	177	468	44
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	72	37	80	267	1	327	397	687	582	378	741	628
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.06	0.37	0.37	0.09	0.40	0.40
Sat Flow, veh/h	0	179	387	751	4	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	95	0	0	191	0	235	91	509	142	177	468	44
Grp Sat Flow(s),veh/h/ln	566	0	0	755	0	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	8.8	2.0	15.1	4.0	3.8	12.9	1.1
Cycle Q Clear(g_c), s	13.2	0.0	0.0	13.2	0.0	8.8	2.0	15.1	4.0	3.8	12.9	1.1
Prop In Lane	0.28		0.68	0.99		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	189	0	0	268	0	327	397	687	582	378	741	628
V/C Ratio(X)	0.50	0.00	0.00	0.71	0.00	0.72	0.23	0.74	0.24	0.47	0.63	0.07
Avail Cap(c_a), veh/h	189	0	0	268	0	327	639	1249	1058	568	1249	1058
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.0	0.0	0.0	26.6	0.0	23.6	12.0	17.6	14.1	12.7	15.5	12.0
Incr Delay (d2), s/veh	2.1	0.0	0.0	8.6	0.0	7.4	0.3	1.6	0.2	0.9	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.2	0.0	0.0	6.2	0.0	6.7	1.3	10.0	2.3	2.5	8.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.1	0.0	0.0	35.2	0.0	31.0	12.3	19.2	14.3	13.6	16.4	12.0
LnGrp LOS	C	A	A	D	A	C	B	B	B	B	B	B
Approach Vol, veh/h		95			426			742			689	
Approach Delay, s/veh		24.1			32.9			17.4			15.4	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.2	30.8		20.0	11.3	32.6		20.0				
Change Period (Y+Rc), s	7.3	7.3		* 6.8	7.3	7.3		* 6.8				
Max Green Setting (Gmax), s	12.7	42.7		* 13	12.7	42.7		* 13				
Max Q Clear Time (g_c+I1), s	5.8	17.1		15.2	4.0	14.9		15.2				
Green Ext Time (p_c), s	0.3	6.3		0.0	0.1	5.7		0.0				

Intersection Summary

HCM 6th Ctrl Delay 20.4
HCM 6th LOS C

Notes

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

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Queuing and Blocking Report
 Rio Road Multi-Family - Albemarle County, VA

Existing (2018) Conditions
 AM Peak Hour

Intersection: 1: Rio Road & John Warner Parkway & CATEC Driveway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	R	LT	R	LT	R
Maximum Queue (ft)	47	314	288	466	310	19	124	190	23	6
Average Queue (ft)	13	171	137	220	123	1	81	117	3	0
95th Queue (ft)	41	266	250	377	259	11	137	193	13	3
Link Distance (ft)		1309		956	956			162	309	
Upstream Blk Time (%)								3		
Queuing Penalty (veh)								19		
Storage Bay Dist (ft)	200		300			500	75			125
Storage Blk Time (%)		6	0				20	13		
Queuing Penalty (veh)		17	0				113	14		

Intersection: 2: Rio Road & Dunlora Drive

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	107	106	199	65	21
Average Queue (ft)	38	38	28	22	1
95th Queue (ft)	84	80	118	56	17
Link Distance (ft)	506		236		162
Upstream Blk Time (%)			0		
Queuing Penalty (veh)			1		
Storage Bay Dist (ft)		200		50	
Storage Blk Time (%)	0			2	
Queuing Penalty (veh)	0			9	

Intersection: 3: Rio Road & Dunlora Forest Drive

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	37	44	31
Average Queue (ft)	10	13	4
95th Queue (ft)	33	34	21
Link Distance (ft)	166		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		25	225
Storage Blk Time (%)	6	3	
Queuing Penalty (veh)	1	0	

Queuing and Blocking Report
Rio Road Multi-Family - Albemarle County, VA

Existing (2018) Conditions
AM Peak Hour

Intersection: 4: Rio Road & Waldorf School Road/Pen Park Road

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	103	188	124	130	261	152	142	305	156
Average Queue (ft)	36	74	43	34	109	34	52	116	18
95th Queue (ft)	80	145	89	86	203	84	102	236	78
Link Distance (ft)	740		1306		976			523	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		350		75		125	225		100
Storage Blk Time (%)				0	15			7	
Queuing Penalty (veh)				2	29			12	

Network Summary

Network wide Queuing Penalty: 218

Rio Road Apartments - Albemarle County, VA
1: Rio Road & John Warner Parkway & CATEC Driveway

Existing (2018) Conditions
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	824	36	537	636	28	38	4	602	5	1	4
Future Volume (veh/h)	15	824	36	537	636	28	38	4	602	5	1	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	16	886	39	577	684	30	41	4	647	5	1	4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	27	1360	60	604	1341	1153	182	18	715	16	3	17
Arrive On Green	0.01	0.39	0.39	0.34	0.72	0.72	0.11	0.11	0.11	0.01	0.01	0.01
Sat Flow, veh/h	1781	3467	153	1781	1870	1585	1630	159	1585	1496	299	1585
Grp Volume(v), veh/h	16	454	471	577	684	30	45	0	647	6	0	4
Grp Sat Flow(s),veh/h/ln	1781	1777	1843	1781	1870	1585	1789	0	1585	1796	0	1585
Q Serve(g_s), s	1.7	40.3	40.3	61.1	31.5	1.0	4.4	0.0	21.6	0.6	0.0	0.5
Cycle Q Clear(g_c), s	1.7	40.3	40.3	61.1	31.5	1.0	4.4	0.0	21.6	0.6	0.0	0.5
Prop In Lane	1.00		0.08	1.00		1.00	0.91		1.00	0.83		1.00
Lane Grp Cap(c), veh/h	27	697	723	604	1341	1153	200	0	715	19	0	17
V/C Ratio(X)	0.60	0.65	0.65	0.96	0.51	0.03	0.22	0.00	0.91	0.31	0.00	0.23
Avail Cap(c_a), veh/h	78	697	723	723	1341	1153	200	0	715	97	0	85
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	94.5	47.9	47.9	62.4	12.2	7.3	78.1	0.0	49.1	94.8	0.0	94.7
Incr Delay (d2), s/veh	19.9	4.7	4.5	21.2	0.3	0.0	0.6	0.0	15.1	8.8	0.0	6.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.7	26.0	26.8	40.3	19.1	0.7	3.8	0.0	41.3	0.6	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	114.4	52.6	52.4	83.6	12.5	7.3	78.6	0.0	64.3	103.6	0.0	101.5
LnGrp LOS	F	D	D	F	B	A	E	A	E	F	A	F
Approach Vol, veh/h		941			1291			692			10	
Approach Delay, s/veh		53.6			44.2			65.2			102.8	
Approach LOS		D			D			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	72.1	81.2		30.0	9.5	143.8		9.7				
Change Period (Y+Rc), s	* 6.7	* 5.5		* 8.4	6.6	* 5.5		7.6				
Max Green Setting (Gmax), s	* 78	* 55		* 22	8.4	* 1.2E2		10.4				
Max Q Clear Time (g_c+I1), s	63.1	42.3		23.6	3.7	33.5		2.6				
Green Ext Time (p_c), s	2.3	7.3		0.0	0.0	11.7		0.0				

Intersection Summary

HCM 6th Ctrl Delay 52.3
HCM 6th LOS D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Apartments - Albemarle County, VA
2: Rio Road & Dunlora Drive

Existing (2018) Conditions
Timing Plan: PM Peak Hour

Intersection

Int Delay, s/veh 1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	24	620	31	68	506
Future Vol, veh/h	22	24	620	31	68	506
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	200	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	26	667	33	73	544

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1374	684	0
Stage 1	684	-	-
Stage 2	690	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	160	449	-
Stage 1	501	-	-
Stage 2	498	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	147	449	-
Mov Cap-2 Maneuver	147	-	-
Stage 1	501	-	-
Stage 2	458	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.4	0	1.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	147	449	897	-
HCM Lane V/C Ratio	-	-	0.161	0.057	0.082	-
HCM Control Delay (s)	-	-	34.1	13.5	9.4	-
HCM Lane LOS	-	-	D	B	A	-
HCM 95th %tile Q(veh)	-	-	0.6	0.2	0.3	-

Rio Road Apartments - Albemarle County, VA
3: Rio Road & Dunlora Forest Drive

Existing (2018) Conditions
Timing Plan: PM Peak Hour

Intersection

Int Delay, s/veh 0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	11	640	9	19	509
Future Vol, veh/h	7	11	640	9	19	509
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	12	711	10	21	566

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1319	711	0
Stage 1	711	-	-
Stage 2	608	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	173	433	-
Stage 1	487	-	-
Stage 2	543	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	169	433	-
Mov Cap-2 Maneuver	169	-	-
Stage 1	487	-	-
Stage 2	530	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.9	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	169	433	881	-
HCM Lane V/C Ratio	-	-	0.046	0.028	0.024	-
HCM Control Delay (s)	-	-	27.3	13.6	9.2	-
HCM Lane LOS	-	-	D	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0.1	0.1	-

Rio Road Apartments - Albemarle County, VA
4: Rio Road & Waldorf School Road/Pen Park Road

Existing (2018) Conditions
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	1	11	49	1	74	7	569	89	105	408	3
Future Volume (veh/h)	6	1	11	49	1	74	7	569	89	105	408	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	7	1	12	54	1	81	8	625	98	115	448	3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	114	24	76	252	4	130	496	852	722	397	973	825
Arrive On Green	0.08	0.08	0.08	0.08	0.08	0.08	0.01	0.46	0.46	0.07	0.52	0.52
Sat Flow, veh/h	323	295	928	1491	43	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	20	0	0	55	0	81	8	625	98	115	448	3
Grp Sat Flow(s),veh/h/ln	1546	0	0	1533	0	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.1	0.0	2.7	0.1	15.1	2.0	1.8	8.4	0.1
Cycle Q Clear(g_c), s	1.7	0.0	0.0	1.6	0.0	2.7	0.1	15.1	2.0	1.8	8.4	0.1
Prop In Lane	0.35		0.60	0.98		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	215	0	0	255	0	130	496	852	722	397	973	825
V/C Ratio(X)	0.09	0.00	0.00	0.22	0.00	0.62	0.02	0.73	0.14	0.29	0.46	0.00
Avail Cap(c_a), veh/h	448	0	0	475	0	378	886	1445	1224	673	1445	1224
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.6	0.0	0.0	24.0	0.0	24.5	8.1	12.3	8.7	9.0	8.4	6.4
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.4	0.0	4.8	0.0	1.2	0.1	0.4	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.4	0.0	0.0	1.2	0.0	2.0	0.1	8.9	1.0	1.0	4.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.7	0.0	0.0	24.4	0.0	29.3	8.1	13.5	8.8	9.4	8.7	6.4
LnGrp LOS	C	A	A	C	A	C	A	B	A	A	A	A
Approach Vol, veh/h		20			136			731			566	
Approach Delay, s/veh		23.7			27.3			12.8			8.8	
Approach LOS		C			C			B			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.4	32.5		11.3	7.9	36.1		11.3				
Change Period (Y+Rc), s	7.3	7.3		* 6.8	7.3	7.3		* 6.8				
Max Green Setting (Gmax), s	12.7	42.7		* 13	12.7	42.7		* 13				
Max Q Clear Time (g_c+I1), s	3.8	17.1		3.7	2.1	10.4		4.7				
Green Ext Time (p_c), s	0.2	8.1		0.0	0.0	5.5		0.3				

Intersection Summary

HCM 6th Ctrl Delay 12.8
HCM 6th LOS B

Notes

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

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Queuing and Blocking Report
 Rio Road Apartments - Albemarle County, VA

Existing (2018) Conditions
 PM Peak Hour

Intersection: 1: Rio Road & John Warner Parkway & CATEC Driveway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	R	LT	R	LT	R
Maximum Queue (ft)	276	782	400	654	330	29	124	180	30	11
Average Queue (ft)	27	350	278	317	84	3	56	143	4	1
95th Queue (ft)	129	633	437	546	226	17	123	209	18	6
Link Distance (ft)		1309		956	956			162	309	
Upstream Blk Time (%)								8		
Queuing Penalty (veh)								53		
Storage Bay Dist (ft)	200		300			500	75			125
Storage Blk Time (%)		30	8				10	31		
Queuing Penalty (veh)		139	36				63	13		

Intersection: 2: Rio Road & Dunlora Drive

Movement	WB	WB	NB	B12	SB	SB
Directions Served	L	R	TR	T	L	T
Maximum Queue (ft)	58	66	302	47	92	138
Average Queue (ft)	15	19	76	2	32	10
95th Queue (ft)	42	51	222	24	75	71
Link Distance (ft)	506		236	573		162
Upstream Blk Time (%)			1			0
Queuing Penalty (veh)			10			1
Storage Bay Dist (ft)		200			50	
Storage Blk Time (%)					4	
Queuing Penalty (veh)					22	

Intersection: 3: Rio Road & Dunlora Forest Drive

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	32	33	47
Average Queue (ft)	5	9	9
95th Queue (ft)	22	30	33
Link Distance (ft)	350		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		25	225
Storage Blk Time (%)	3	2	
Queuing Penalty (veh)	0	0	

Queuing and Blocking Report
Rio Road Apartments - Albemarle County, VA

Existing (2018) Conditions
PM Peak Hour

Intersection: 4: Rio Road & Waldorf School Road/Pen Park Road

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	40	80	67	56	252	149	108	217	23
Average Queue (ft)	9	27	23	4	121	27	40	68	1
95th Queue (ft)	29	62	49	31	210	86	84	167	9
Link Distance (ft)	736		1306		976			546	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		350		75		125	225		100
Storage Blk Time (%)					13			2	
Queuing Penalty (veh)					13			3	

Network Summary

Network wide Queuing Penalty: 352

Rio Road Multi-Family - Albemarle County, VA
1: Rio Road & John Warner Parkway & CATEC Driveway

No-Build (2023) Conditions
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	548	33	543	804	9	115	2	639	4	1	1
Future Volume (veh/h)	14	548	33	543	804	9	115	2	639	4	1	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	16	609	37	603	893	10	128	2	710	4	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	27	1299	79	629	1347	1153	196	3	737	10	3	11
Arrive On Green	0.01	0.38	0.38	0.35	0.72	0.72	0.11	0.11	0.11	0.01	0.01	0.01
Sat Flow, veh/h	1781	3403	207	1781	1870	1585	1755	27	1585	1439	360	1585
Grp Volume(v), veh/h	16	318	328	603	893	10	130	0	710	5	0	1
Grp Sat Flow(s),veh/h/ln	1781	1777	1833	1781	1870	1585	1783	0	1585	1798	0	1585
Q Serve(g_s), s	1.7	26.0	26.0	63.9	49.3	0.3	13.5	0.0	21.6	0.5	0.0	0.1
Cycle Q Clear(g_c), s	1.7	26.0	26.0	63.9	49.3	0.3	13.5	0.0	21.6	0.5	0.0	0.1
Prop In Lane	1.00		0.11	1.00		1.00	0.98		1.00	0.80		1.00
Lane Grp Cap(c), veh/h	27	678	700	629	1347	1153	200	0	737	13	0	11
V/C Ratio(X)	0.60	0.47	0.47	0.96	0.66	0.01	0.65	0.00	0.96	0.39	0.00	0.09
Avail Cap(c_a), veh/h	78	678	700	723	1347	1153	200	0	737	97	0	85
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	94.5	44.9	44.9	61.0	14.4	7.2	82.1	0.0	50.0	95.4	0.0	95.2
Incr Delay (d2), s/veh	19.9	2.3	2.3	22.3	1.2	0.0	7.3	0.0	24.4	18.2	0.0	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.7	17.7	18.3	42.1	28.3	0.2	10.9	0.0	48.3	0.6	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	114.4	47.2	47.2	83.4	15.7	7.2	89.4	0.0	74.4	113.6	0.0	98.5
LnGrp LOS	F	D	D	F	B	A	F	A	E	F	A	F
Approach Vol, veh/h		662			1506			840			6	
Approach Delay, s/veh		48.8			42.7			76.7			111.1	
Approach LOS		D			D			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	74.9	79.2		30.0	9.5	144.5		9.0				
Change Period (Y+Rc), s	* 6.7	* 5.5		* 8.4	6.6	* 5.5		7.6				
Max Green Setting (Gmax), s	* 78	* 55		* 22	8.4	* 1.2E2		10.4				
Max Q Clear Time (g_c+I1), s	65.9	28.0		23.6	3.7	51.3		2.5				
Green Ext Time (p_c), s	2.3	7.5		0.0	0.0	19.2		0.0				

Intersection Summary

HCM 6th Ctrl Delay 53.7
HCM 6th LOS D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Multi-Family - Albemarle County, VA
2: Rio Road & Dunlora Drive

No-Build (2023) Conditions
Timing Plan: AM Peak Hour

Intersection

Int Delay, s/veh 9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	95	76	680	34	55	521
Future Vol, veh/h	95	76	680	34	55	521
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	200	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	108	86	773	39	63	592

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1511	793	0
Stage 1	793	-	-
Stage 2	718	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	132	389	-
Stage 1	446	-	-
Stage 2	483	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	122	389	-
Mov Cap-2 Maneuver	122	-	-
Stage 1	446	-	-
Stage 2	446	-	-

Approach	WB	NB	SB
HCM Control Delay, s	74.2	0	0.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	122	389	814	-
HCM Lane V/C Ratio	-	-	0.885	0.222	0.077	-
HCM Control Delay (s)	-	-	120.1	16.9	9.8	-
HCM Lane LOS	-	-	F	C	A	-
HCM 95th %tile Q(veh)	-	-	5.5	0.8	0.2	-

Rio Road Multi-Family - Albemarle County, VA
3: Rio Road & Dunlora Forest Drive

No-Build (2023) Conditions
Timing Plan: AM Peak Hour

Intersection

Int Delay, s/veh 0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	25	689	8	9	607
Future Vol, veh/h	15	25	689	8	9	607
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	28	766	9	10	674

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1460	766	0
Stage 1	766	-	-
Stage 2	694	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	142	403	-
Stage 1	459	-	-
Stage 2	496	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	140	403	-
Mov Cap-2 Maneuver	140	-	-
Stage 1	459	-	-
Stage 2	490	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	140	403	841	-
HCM Lane V/C Ratio	-	-	0.119	0.069	0.012	-
HCM Control Delay (s)	-	-	34.2	14.6	9.3	-
HCM Lane LOS	-	-	D	B	A	-
HCM 95th %tile Q(veh)	-	-	0.4	0.2	0	-

Rio Road Multi-Family - Albemarle County, VA
4: Rio Road & Waldorf School Road/Pen Park Road

No-Build (2023) Conditions
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	2	56	163	1	201	78	473	122	152	433	37
Future Volume (veh/h)	23	2	56	163	1	201	78	473	122	152	433	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	29	3	72	209	1	258	100	606	156	195	555	47
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	66	33	75	243	1	299	384	774	656	360	831	705
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.06	0.41	0.41	0.09	0.44	0.44
Sat Flow, veh/h	0	177	399	745	4	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	104	0	0	210	0	258	100	606	156	195	555	47
Grp Sat Flow(s),veh/h/ln	576	0	0	749	0	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	11.0	2.2	19.7	4.5	4.3	16.4	1.2
Cycle Q Clear(g_c), s	13.2	0.0	0.0	13.2	0.0	11.0	2.2	19.7	4.5	4.3	16.4	1.2
Prop In Lane	0.28		0.69	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	0	0	244	0	299	384	774	656	360	831	705
V/C Ratio(X)	0.60	0.00	0.00	0.86	0.00	0.86	0.26	0.78	0.24	0.54	0.67	0.07
Avail Cap(c_a), veh/h	174	0	0	244	0	299	598	1141	967	519	1141	967
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.1	0.0	0.0	30.6	0.0	27.5	11.9	17.8	13.4	13.4	15.4	11.1
Incr Delay (d2), s/veh	5.4	0.0	0.0	25.5	0.0	22.0	0.4	2.2	0.2	1.3	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.1	0.0	0.0	8.9	0.0	9.6	1.4	12.5	2.6	2.8	10.4	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.5	0.0	0.0	56.0	0.0	49.5	12.2	20.0	13.5	14.7	16.3	11.2
LnGrp LOS	C	A	A	E	A	D	B	B	B	B	B	B
Approach Vol, veh/h		104			468			862			797	
Approach Delay, s/veh		30.5			52.5			17.9			15.6	
Approach LOS		C			D			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.8	36.3		20.0	11.6	38.4		20.0				
Change Period (Y+Rc), s	7.3	7.3		* 6.8	7.3	7.3		* 6.8				
Max Green Setting (Gmax), s	12.7	42.7		* 13	12.7	42.7		* 13				
Max Q Clear Time (g_c+I1), s	6.3	21.7		15.2	4.2	18.4		15.2				
Green Ext Time (p_c), s	0.4	7.3		0.0	0.2	6.7		0.0				

Intersection Summary

HCM 6th Ctrl Delay 24.9
HCM 6th LOS C

Notes

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

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Queuing and Blocking Report
 Rio Road Multi-Family - Albemarle County, VA

No-Build (2023) Conditions
 AM Peak Hour

Intersection: 1: Rio Road & John Warner Parkway & CATEC Driveway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	R	LT	R	LT	R
Maximum Queue (ft)	100	471	371	581	481	24	124	213	22	6
Average Queue (ft)	19	224	191	288	169	2	100	153	3	0
95th Queue (ft)	79	366	319	504	366	13	147	220	15	4
Link Distance (ft)		1309		956	956			162	309	
Upstream Blk Time (%)								13		
Queuing Penalty (veh)								99		
Storage Bay Dist (ft)	200		300			500	75			125
Storage Blk Time (%)		17	2		0		38	20		
Queuing Penalty (veh)		55	5		0		244	24		

Intersection: 2: Rio Road & Dunlora Drive

Movement	WB	WB	NB	B12	B10	SB	SB
Directions Served	L	R	TR	T	T	L	T
Maximum Queue (ft)	287	210	285	271	10	80	94
Average Queue (ft)	119	87	111	34	0	29	5
95th Queue (ft)	339	224	293	207	11	65	46
Link Distance (ft)	506		236	573	268		162
Upstream Blk Time (%)	5		6	0			0
Queuing Penalty (veh)	0		44	3			0
Storage Bay Dist (ft)		200				50	
Storage Blk Time (%)	4	10				4	
Queuing Penalty (veh)	3	10				21	

Intersection: 3: Rio Road & Dunlora Forest Drive

Movement	WB	WB	SB	SB
Directions Served	L	R	L	T
Maximum Queue (ft)	44	44	33	7
Average Queue (ft)	12	15	5	0
95th Queue (ft)	36	36	24	8
Link Distance (ft)	138			268
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		25	225	
Storage Blk Time (%)	10	5		
Queuing Penalty (veh)	3	1		

Queuing and Blocking Report
Rio Road Multi-Family - Albemarle County, VA

No-Build (2023) Conditions
AM Peak Hour

Intersection: 4: Rio Road & Waldorf School Road/Pen Park Road

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	135	240	180	160	383	198	199	350	144
Average Queue (ft)	46	99	60	41	145	48	67	128	20
95th Queue (ft)	100	211	130	103	300	141	145	265	91
Link Distance (ft)	744		1307		976			546	
Upstream Blk Time (%)								0	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)		350		75		125	225		100
Storage Blk Time (%)		1		1	20		0	9	
Queuing Penalty (veh)		2		5	42		0	18	

Network Summary

Network wide Queuing Penalty: 579

Rio Road Apartments - Albemarle County, VA
1: Rio Road & John Warner Parkway & CATEC Driveway

No-Build (2023) Conditions
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	974	48	622	741	31	47	4	680	6	1	4
Future Volume (veh/h)	17	974	48	622	741	31	47	4	680	6	1	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	1047	52	669	797	33	51	4	731	6	1	4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	1183	59	689	1337	1151	186	15	791	18	3	18
Arrive On Green	0.02	0.34	0.34	0.39	0.71	0.71	0.11	0.11	0.11	0.01	0.01	0.01
Sat Flow, veh/h	1781	3445	171	1781	1870	1585	1657	130	1585	1537	256	1585
Grp Volume(v), veh/h	18	540	559	669	797	33	55	0	731	7	0	4
Grp Sat Flow(s),veh/h/ln	1781	1777	1840	1781	1870	1585	1787	0	1585	1793	0	1585
Q Serve(g_s), s	1.9	55.3	55.3	71.2	40.9	1.1	5.4	0.0	21.6	0.7	0.0	0.5
Cycle Q Clear(g_c), s	1.9	55.3	55.3	71.2	40.9	1.1	5.4	0.0	21.6	0.7	0.0	0.5
Prop In Lane	1.00		0.09	1.00		1.00	0.93		1.00	0.86		1.00
Lane Grp Cap(c), veh/h	29	610	632	689	1337	1151	200	0	791	21	0	18
V/C Ratio(X)	0.63	0.88	0.88	0.97	0.60	0.03	0.27	0.00	0.92	0.34	0.00	0.22
Avail Cap(c_a), veh/h	78	610	632	723	1337	1151	200	0	791	97	0	85
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	94.4	59.8	59.8	58.1	13.7	7.4	78.5	0.0	45.0	94.7	0.0	94.5
Incr Delay (d2), s/veh	20.6	17.0	16.6	25.8	0.7	0.0	0.7	0.0	16.5	9.3	0.0	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	27.8	28.7	36.8	17.2	0.4	2.6	0.0	36.1	0.4	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	115.0	76.8	76.4	83.9	14.4	7.4	79.3	0.0	61.5	104.0	0.0	100.4
LnGrp LOS	F	E	E	F	B	A	E	A	E	F	A	F
Approach Vol, veh/h		1117			1499			786			11	
Approach Delay, s/veh		77.2			45.2			62.7			102.7	
Approach LOS		E			D			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	81.4	71.8		30.0	9.7	143.5		9.8				
Change Period (Y+Rc), s	* 6.7	* 5.5		* 8.4	6.6	* 5.5		7.6				
Max Green Setting (Gmax), s	* 78	* 55		* 22	8.4	* 1.2E2		10.4				
Max Q Clear Time (g_c+l1), s	73.2	57.3		23.6	3.9	42.9		2.7				
Green Ext Time (p_c), s	1.5	0.0		0.0	0.0	15.5		0.0				

Intersection Summary

HCM 6th Ctrl Delay 59.9
HCM 6th LOS E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Apartments - Albemarle County, VA
2: Rio Road & Dunlora Drive

No-Build (2023) Conditions
Timing Plan: PM Peak Hour

Intersection

Int Delay, s/veh 2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	37	31	700	59	83	588
Future Vol, veh/h	37	31	700	59	83	588
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	200	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	33	753	63	89	632

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1595	785	0
Stage 1	785	-	-
Stage 2	810	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	118	393	-
Stage 1	449	-	-
Stage 2	438	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	105	393	-
Mov Cap-2 Maneuver	105	-	-
Stage 1	449	-	-
Stage 2	390	-	-

Approach	WB	NB	SB
HCM Control Delay, s	38.8	0	1.2
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	105	393	812	-
HCM Lane V/C Ratio	-	-	0.379	0.085	0.11	-
HCM Control Delay (s)	-	-	58.8	15	10	-
HCM Lane LOS	-	-	F	C	A	-
HCM 95th %tile Q(veh)	-	-	1.5	0.3	0.4	-

Rio Road Apartments - Albemarle County, VA
3: Rio Road & Dunlora Forest Drive

No-Build (2023) Conditions
Timing Plan: PM Peak Hour

Intersection

Int Delay, s/veh 0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	12	747	10	21	604
Future Vol, veh/h	8	12	747	10	21	604
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	200	250	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	13	830	11	23	671

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1547	830	0
Stage 1	830	-	-
Stage 2	717	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	126	370	-
Stage 1	428	-	-
Stage 2	484	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	122	370	-
Mov Cap-2 Maneuver	122	-	-
Stage 1	428	-	-
Stage 2	470	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.8	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	122	370	794	-
HCM Lane V/C Ratio	-	-	0.073	0.036	0.029	-
HCM Control Delay (s)	-	-	36.8	15.1	9.7	-
HCM Lane LOS	-	-	E	C	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0.1	0.1	-

Rio Road Apartments - Albemarle County, VA
4: Rio Road & Waldorf School Road/Pen Park Road

No-Build (2023) Conditions
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	1	12	54	1	81	8	669	98	116	493	3
Future Volume (veh/h)	7	1	12	54	1	81	8	669	98	116	493	3
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	8	1	13	59	1	89	9	735	108	127	542	3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	106	28	79	242	3	137	463	934	792	357	1046	886
Arrive On Green	0.09	0.09	0.09	0.09	0.09	0.09	0.01	0.50	0.50	0.07	0.56	0.56
Sat Flow, veh/h	311	322	914	1477	37	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	22	0	0	60	0	89	9	735	108	127	542	3
Grp Sat Flow(s),veh/h/ln	1546	0	0	1513	0	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.6	0.0	3.4	0.2	20.2	2.3	2.1	11.2	0.1
Cycle Q Clear(g_c), s	2.3	0.0	0.0	2.1	0.0	3.4	0.2	20.2	2.3	2.1	11.2	0.1
Prop In Lane	0.36		0.59	0.98		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	212	0	0	245	0	137	463	934	792	357	1046	886
V/C Ratio(X)	0.10	0.00	0.00	0.24	0.00	0.65	0.02	0.79	0.14	0.36	0.52	0.00
Avail Cap(c_a), veh/h	398	0	0	421	0	335	805	1280	1085	592	1280	1085
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.4	0.0	0.0	27.0	0.0	27.6	8.0	12.9	8.4	10.3	8.5	6.1
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.5	0.0	5.1	0.0	2.3	0.1	0.6	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.0	0.8	0.0	1.4	0.1	7.4	0.7	0.6	3.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.6	0.0	0.0	27.5	0.0	32.7	8.0	15.2	8.5	10.9	8.9	6.1
LnGrp LOS	C	A	A	C	A	C	A	B	A	B	A	A
Approach Vol, veh/h		22			149			852			672	
Approach Delay, s/veh		26.6			30.6			14.3			9.3	
Approach LOS		C			C			B			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.7	38.5		12.2	8.0	42.2		12.2				
Change Period (Y+Rc), s	7.3	7.3		* 6.8	7.3	7.3		* 6.8				
Max Green Setting (Gmax), s	12.7	42.7		* 13	12.7	42.7		* 13				
Max Q Clear Time (g_c+I1), s	4.1	22.2		4.3	2.2	13.2		5.4				
Green Ext Time (p_c), s	0.2	9.0		0.0	0.0	6.9		0.3				

Intersection Summary

HCM 6th Ctrl Delay 13.9
HCM 6th LOS B

Notes

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

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Queuing and Blocking Report
 Rio Road Apartments - Albemarle County, VA

No-Build (2023) Conditions
 PM Peak Hour

Intersection: 1: Rio Road & John Warner Parkway & CATEC Driveway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	R	LT	R	LT	R
Maximum Queue (ft)	299	1289	400	803	455	32	124	191	35	13
Average Queue (ft)	40	830	368	405	121	3	70	159	6	1
95th Queue (ft)	174	1488	472	699	358	18	135	212	23	8
Link Distance (ft)		1309		956	956			162	309	
Upstream Blk Time (%)		10		0	0			18		
Queuing Penalty (veh)		0		0	0			135		
Storage Bay Dist (ft)	200		300			500	75			125
Storage Blk Time (%)		49	34		0		20	35		
Queuing Penalty (veh)		272	172		0		136	18		

Intersection: 2: Rio Road & Dunlora Drive

Movement	WB	WB	NB	B12	B10	SB	SB
Directions Served	L	R	TR	T	T	L	T
Maximum Queue (ft)	78	84	314	347	3	98	183
Average Queue (ft)	25	27	172	37	0	47	37
95th Queue (ft)	59	66	354	199	3	94	147
Link Distance (ft)	506		236	563	277		162
Upstream Blk Time (%)			9	0			1
Queuing Penalty (veh)			73	1			8
Storage Bay Dist (ft)		200				50	
Storage Blk Time (%)						14	
Queuing Penalty (veh)						84	

Intersection: 3: Rio Road & Dunlora Forest Drive

Movement	WB	WB	NB	SB
Directions Served	L	R	R	L
Maximum Queue (ft)	27	22	2	36
Average Queue (ft)	5	6	0	8
95th Queue (ft)	21	20	2	31
Link Distance (ft)	117			
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		25	200	250
Storage Blk Time (%)	4	1		
Queuing Penalty (veh)	1	0		

Intersection: 4: Rio Road & Waldorf School Road/Pen Park Road

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	44	80	81	82	322	162	108	235	10
Average Queue (ft)	10	29	26	7	146	30	46	86	0
95th Queue (ft)	32	64	58	43	264	93	90	191	5
Link Distance (ft)	738		1306		976			549	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		350		75		125	225		100
Storage Blk Time (%)					18	0		4	
Queuing Penalty (veh)					19	0		4	

Network Summary

Network wide Queuing Penalty: 924

Rio Road Multi-Family - Albemarle County, VA Build (2023) Conditions - No Improvements
 1: Rio Road & John Warner Parkway & CATEC Driveway Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	548	43	553	804	9	142	3	667	4	1	1
Future Volume (veh/h)	14	548	43	553	804	9	142	3	667	4	1	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	16	609	48	614	893	10	158	3	741	4	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	27	1254	99	640	1347	1153	196	4	746	10	3	11
Arrive On Green	0.01	0.38	0.38	0.36	0.72	0.72	0.11	0.11	0.11	0.01	0.01	0.01
Sat Flow, veh/h	1781	3337	263	1781	1870	1585	1750	33	1585	1439	360	1585
Grp Volume(v), veh/h	16	324	333	614	893	10	161	0	741	5	0	1
Grp Sat Flow(s),veh/h/ln	1781	1777	1823	1781	1870	1585	1783	0	1585	1798	0	1585
Q Serve(g_s), s	1.7	26.8	26.9	65.1	49.3	0.3	17.0	0.0	21.6	0.5	0.0	0.1
Cycle Q Clear(g_c), s	1.7	26.8	26.9	65.1	49.3	0.3	17.0	0.0	21.6	0.5	0.0	0.1
Prop In Lane	1.00		0.14	1.00		1.00	0.98		1.00	0.80		1.00
Lane Grp Cap(c), veh/h	27	668	685	640	1347	1153	200	0	746	13	0	11
V/C Ratio(X)	0.60	0.48	0.49	0.96	0.66	0.01	0.81	0.00	0.99	0.39	0.00	0.09
Avail Cap(c_a), veh/h	78	668	685	723	1347	1153	200	0	746	97	0	85
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	94.5	46.0	46.0	60.5	14.4	7.2	83.7	0.0	50.7	95.4	0.0	95.2
Incr Delay (d2), s/veh	19.9	2.5	2.5	22.8	1.2	0.0	21.1	0.0	31.0	18.2	0.0	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.7	18.3	18.7	42.8	28.3	0.2	14.0	0.0	52.5	0.6	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	114.4	48.5	48.5	83.3	15.7	7.2	104.8	0.0	81.8	113.6	0.0	98.5
LnGrp LOS	F	D	D	F	B	A	F	A	F	F	A	F
Approach Vol, veh/h		673			1517			902			6	
Approach Delay, s/veh		50.0			43.0			85.9			111.1	
Approach LOS		D			D			F			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	76.0	78.0		30.0	9.5	144.5		9.0				
Change Period (Y+Rc), s	* 6.7	* 5.5		* 8.4	6.6	* 5.5		7.6				
Max Green Setting (Gmax), s	* 78	* 55		* 22	8.4	* 1.2E2		10.4				
Max Q Clear Time (g_c+I1), s	67.1	28.9		23.6	3.7	51.3		2.5				
Green Ext Time (p_c), s	2.2	7.5		0.0	0.0	19.2		0.0				

Intersection Summary

HCM 6th Ctrl Delay	57.1
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Multi-Family - Albemarle County, VA
2: Rio Road & Dunlora Drive

Build (2023) Conditions - No Improvements
Timing Plan: AM Peak Hour

Intersection

Int Delay, s/veh 11.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	95	76	736	35	55	541
Future Vol, veh/h	95	76	736	35	55	541
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	200	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	108	86	836	40	63	615

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1597	856	0
Stage 1	856	-	-
Stage 2	741	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	117	357	-
Stage 1	416	-	-
Stage 2	471	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	~ 107	357	-
Mov Cap-2 Maneuver	~ 107	-	-
Stage 1	416	-	-
Stage 2	432	-	-

Approach	WB	NB	SB
HCM Control Delay, s	99.4	0	0.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 107 357	771	-
HCM Lane V/C Ratio	-	- 1.009 0.242	0.081	-
HCM Control Delay (s)	-	- 164.3 18.3	10.1	-
HCM Lane LOS	-	- F C	B	-
HCM 95th %tile Q(veh)	-	- 6.4 0.9	0.3	-

Notes

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

Rio Road Multi-Family - Albemarle County, VA
3: Rio Road & Dunlora Forest Drive

Build (2023) Conditions - No Improvements
Timing Plan: AM Peak Hour

Intersection

Int Delay, s/veh 0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	25	700	8	9	637
Future Vol, veh/h	15	25	700	8	9	637
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	28	778	9	10	708

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1506	778	0
Stage 1	778	-	-
Stage 2	728	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	133	396	-
Stage 1	453	-	-
Stage 2	478	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	131	396	-
Mov Cap-2 Maneuver	131	-	-
Stage 1	453	-	-
Stage 2	472	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.9	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	-	131	396
HCM Lane V/C Ratio	-	-	0.127	0.07
HCM Control Delay (s)	-	-	36.4	14.8
HCM Lane LOS	-	-	E	B
HCM 95th %tile Q(veh)	-	-	0.4	0.2

Rio Road Multi-Family - Albemarle County, VA Build (2023) Conditions - No Improvements
 4: Rio Road & Waldorf School Road/Pen Park Road Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	2	56	163	1	202	78	483	122	154	460	38
Future Volume (veh/h)	23	2	56	163	1	202	78	483	122	154	460	38
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	29	3	72	209	1	259	100	619	156	197	590	49
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	65	33	74	240	1	295	366	784	665	358	843	714
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.06	0.42	0.42	0.09	0.45	0.45
Sat Flow, veh/h	0	177	399	745	4	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	104	0	0	210	0	259	100	619	156	197	590	49
Grp Sat Flow(s),veh/h/ln	576	0	0	749	0	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	11.3	2.2	20.3	4.5	4.3	17.9	1.2
Cycle Q Clear(g_c), s	13.2	0.0	0.0	13.2	0.0	11.3	2.2	20.3	4.5	4.3	17.9	1.2
Prop In Lane	0.28		0.69	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	172	0	0	241	0	295	366	784	665	358	843	714
V/C Ratio(X)	0.60	0.00	0.00	0.87	0.00	0.88	0.27	0.79	0.23	0.55	0.70	0.07
Avail Cap(c_a), veh/h	172	0	0	241	0	295	577	1128	956	513	1128	956
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.5	0.0	0.0	31.0	0.0	28.0	12.1	17.8	13.2	13.6	15.6	11.0
Incr Delay (d2), s/veh	5.8	0.0	0.0	27.4	0.0	24.3	0.4	2.5	0.2	1.3	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.1	0.0	0.0	9.1	0.0	10.0	1.4	12.9	2.6	2.8	11.3	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.3	0.0	0.0	58.4	0.0	52.3	12.5	20.3	13.4	14.9	16.9	11.1
LnGrp LOS	C	A	A	E	A	D	B	C	B	B	B	B
Approach Vol, veh/h		104			469			875			836	
Approach Delay, s/veh		31.3			55.0			18.2			16.1	
Approach LOS		C			E			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.8	37.0		20.0	11.6	39.2		20.0				
Change Period (Y+Rc), s	7.3	7.3		* 6.8	7.3	7.3		* 6.8				
Max Green Setting (Gmax), s	12.7	42.7		* 13	12.7	42.7		* 13				
Max Q Clear Time (g_c+I1), s	6.3	22.3		15.2	4.2	19.9		15.2				
Green Ext Time (p_c), s	0.4	7.3		0.0	0.2	7.0		0.0				

Intersection Summary

HCM 6th Ctrl Delay	25.6
HCM 6th LOS	C

Notes

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

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Multi-Family - Albemarle County, VA
6: Full-movement Driveway

Build (2023) Conditions - No Improvements
Timing Plan: AM Peak Hour

Intersection

Int Delay, s/veh 2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	57	30	11	714	616	9
Future Vol, veh/h	57	30	11	714	616	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	100	-	-	1
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	100	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	62	30	12	776	670	10

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1470	670	680
Stage 1	670	-	-
Stage 2	800	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	140	457	912
Stage 1	509	-	-
Stage 2	442	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	138	457	912
Mov Cap-2 Maneuver	138	-	-
Stage 1	502	-	-
Stage 2	442	-	-

Approach	EB	NB	SB
HCM Control Delay, s	38.6	0.1	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	912	-	138	457	-	-
HCM Lane V/C Ratio	0.013	-	0.449	0.066	-	-
HCM Control Delay (s)	9	-	50.8	13.4	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0	-	2	0.2	-	-

Queuing and Blocking Report
 Rio Road Multi-Family - Albemarle County, VA

Build (2023) Conditions - No Improvements

AM Peak Hour

Intersection: 1: Rio Road & John Warner Parkway & CATEC Driveway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	R	LT	R	LT	R
Maximum Queue (ft)	102	551	391	568	461	19	124	215	22	7
Average Queue (ft)	16	260	223	293	169	1	106	164	3	0
95th Queue (ft)	64	429	358	500	374	10	144	231	14	3
Link Distance (ft)		1309		956	956			164	309	
Upstream Blk Time (%)								21		
Queuing Penalty (veh)								169		
Storage Bay Dist (ft)	200		300			500	75			125
Storage Blk Time (%)		23	3		0		47	16		
Queuing Penalty (veh)		76	9		0		316	24		

Intersection: 2: Rio Road & Dunlora Drive

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	401	255	228	84	150
Average Queue (ft)	183	124	135	32	11
95th Queue (ft)	493	298	284	70	76
Link Distance (ft)	519		213		164
Upstream Blk Time (%)	16		11		0
Queuing Penalty (veh)	0		85		1
Storage Bay Dist (ft)		200		50	
Storage Blk Time (%)	6	25		7	
Queuing Penalty (veh)	4	25		36	

Intersection: 3: Rio Road & Dunlora Forest Drive

Movement	WB	WB	NB	SB
Directions Served	L	R	T	L
Maximum Queue (ft)	47	38	44	35
Average Queue (ft)	12	16	2	5
95th Queue (ft)	36	38	44	25
Link Distance (ft)	148		548	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		25		225
Storage Blk Time (%)	10	6	0	
Queuing Penalty (veh)	3	1	0	

Queuing and Blocking Report
Rio Road Multi-Family - Albemarle County, VA

Build (2023) Conditions - No Improvements
AM Peak Hour

Intersection: 4: Rio Road & Waldorf School Road/Pen Park Road

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	131	231	146	147	373	178	221	344	141
Average Queue (ft)	44	93	63	43	146	44	61	121	12
95th Queue (ft)	103	181	115	114	281	134	140	254	63
Link Distance (ft)	747		1307		976			548	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		350		75		125	225		100
Storage Blk Time (%)				1	21			7	
Queuing Penalty (veh)				5	44			15	

Intersection: 5: Right-in Driveway & Rio Road

Movement	NB	B16
Directions Served	T	T
Maximum Queue (ft)	167	220
Average Queue (ft)	59	49
95th Queue (ft)	178	201
Link Distance (ft)	90	184
Upstream Blk Time (%)	11	5
Queuing Penalty (veh)	85	35
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Full-movement Driveway

Movement	EB	EB	NB	NB	B10	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	149	70	61	122	75	2
Average Queue (ft)	48	22	5	20	10	0
95th Queue (ft)	127	54	34	126	94	2
Link Distance (ft)	369	369		191	260	
Upstream Blk Time (%)	0			2	0	
Queuing Penalty (veh)	0			14	3	
Storage Bay Dist (ft)			100			1
Storage Blk Time (%)				3		
Queuing Penalty (veh)				0		

Network Summary

Network wide Queuing Penalty: 950

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	974	74	649	741	31	63	5	697	6	2	4
Future Volume (veh/h)	17	974	74	649	741	31	63	5	697	6	2	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	1047	80	698	797	33	68	5	749	6	2	4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	1102	84	713	1336	1151	186	14	812	17	6	19
Arrive On Green	0.02	0.33	0.33	0.40	0.71	0.71	0.11	0.11	0.11	0.01	0.01	0.01
Sat Flow, veh/h	1781	3346	256	1781	1870	1585	1665	122	1585	1352	451	1585
Grp Volume(v), veh/h	18	556	571	698	797	33	73	0	749	8	0	4
Grp Sat Flow(s),veh/h/ln	1781	1777	1824	1781	1870	1585	1787	0	1585	1803	0	1585
Q Serve(g_s), s	1.9	58.9	59.0	74.6	41.0	1.1	7.3	0.0	21.6	0.8	0.0	0.5
Cycle Q Clear(g_c), s	1.9	58.9	59.0	74.6	41.0	1.1	7.3	0.0	21.6	0.8	0.0	0.5
Prop In Lane	1.00		0.14	1.00		1.00	0.93		1.00	0.75		1.00
Lane Grp Cap(c), veh/h	29	585	601	713	1336	1151	200	0	812	22	0	19
V/C Ratio(X)	0.63	0.95	0.95	0.98	0.60	0.03	0.36	0.00	0.92	0.36	0.00	0.21
Avail Cap(c_a), veh/h	78	585	601	723	1336	1151	200	0	812	97	0	85
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	94.4	63.1	63.2	57.1	13.7	7.4	79.4	0.0	43.6	94.6	0.0	94.4
Incr Delay (d2), s/veh	20.6	26.6	26.3	28.1	0.7	0.0	1.1	0.0	16.0	9.6	0.0	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.9	40.0	40.9	49.1	24.0	0.7	6.2	0.0	46.6	0.8	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	115.0	89.7	89.4	85.2	14.5	7.4	80.5	0.0	59.5	104.2	0.0	99.5
LnGrp LOS	F	F	F	F	B	A	F	A	E	F	A	F
Approach Vol, veh/h		1145			1528			822			12	
Approach Delay, s/veh		90.0			46.6			61.4			102.6	
Approach LOS		F			D			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	83.9	69.1		30.0	9.7	143.3		10.0				
Change Period (Y+Rc), s	* 6.7	* 5.5		* 8.4	6.6	* 5.5		7.6				
Max Green Setting (Gmax), s	* 78	* 55		* 22	8.4	* 1.2E2		10.4				
Max Q Clear Time (g_c+I1), s	76.6	61.0		23.6	3.9	43.0		2.8				
Green Ext Time (p_c), s	0.6	0.0		0.0	0.0	15.5		0.0				

Intersection Summary

HCM 6th Ctrl Delay	64.4
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Apartments - Albemarle County, VA
2: Rio Road & Dunlora Drive

Build (2023) Conditions - No Improvements
Timing Plan: PM Peak Hour

Intersection

Int Delay, s/veh 2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	38	31	734	60	83	642
Future Vol, veh/h	38	31	734	60	83	642
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	200	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	41	33	789	65	89	690

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1690	822	0
Stage 1	822	-	-
Stage 2	868	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	103	374	-
Stage 1	432	-	-
Stage 2	411	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	91	374	-
Mov Cap-2 Maneuver	91	-	-
Stage 1	432	-	-
Stage 2	365	-	-

Approach	WB	NB	SB
HCM Control Delay, s	47.4	0	1.2
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	-	91	374
HCM Lane V/C Ratio	-	-	0.449	0.089
HCM Control Delay (s)	-	-	73.4	15.6
HCM Lane LOS	-	-	F	C
HCM 95th %tile Q(veh)	-	-	1.9	0.3

Rio Road Apartments - Albemarle County, VA
3: Rio Road & Dunlora Forest Drive

Build (2023) Conditions - No Improvements
Timing Plan: PM Peak Hour

Intersection

Int Delay, s/veh 0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	12	777	10	21	623
Future Vol, veh/h	8	12	777	10	21	623
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	13	863	11	23	692

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1601	863	0
Stage 1	863	-	-
Stage 2	738	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	117	354	-
Stage 1	413	-	-
Stage 2	473	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	113	354	-
Mov Cap-2 Maneuver	113	-	-
Stage 1	413	-	-
Stage 2	459	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.2	0	0.3
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 113 354	772	-
HCM Lane V/C Ratio	-	- 0.079 0.038	0.03	-
HCM Control Delay (s)	-	- 39.6 15.6	9.8	-
HCM Lane LOS	-	- E C	A	-
HCM 95th %tile Q(veh)	-	- 0.3 0.1	0.1	-

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1	12	54	1	83	8	696	98	117	510	4
Future Volume (veh/h)	8	1	12	54	1	83	8	696	98	117	510	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	9	1	13	59	1	91	9	765	108	129	560	4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	29	76	240	3	138	458	954	808	345	1063	901
Arrive On Green	0.09	0.09	0.09	0.09	0.09	0.09	0.01	0.51	0.51	0.07	0.57	0.57
Sat Flow, veh/h	336	336	873	1477	36	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	23	0	0	60	0	91	9	765	108	129	560	4
Grp Sat Flow(s),veh/h/ln	1544	0	0	1513	0	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.6	0.0	3.6	0.2	21.8	2.3	2.1	11.9	0.1
Cycle Q Clear(g_c), s	2.3	0.0	0.0	2.2	0.0	3.6	0.2	21.8	2.3	2.1	11.9	0.1
Prop In Lane	0.39		0.57	0.98		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	212	0	0	243	0	138	458	954	808	345	1063	901
V/C Ratio(X)	0.11	0.00	0.00	0.25	0.00	0.66	0.02	0.80	0.13	0.37	0.53	0.00
Avail Cap(c_a), veh/h	386	0	0	409	0	326	789	1243	1053	572	1243	1053
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.1	0.0	0.0	27.7	0.0	28.4	7.9	13.1	8.3	10.8	8.5	6.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.5	0.0	5.3	0.0	2.9	0.1	0.7	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	0.0	0.0	1.5	0.0	2.7	0.1	12.7	1.2	1.2	6.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.4	0.0	0.0	28.2	0.0	33.7	7.9	16.0	8.4	11.4	9.0	6.0
LnGrp LOS	C	A	A	C	A	C	A	B	A	B	A	A
Approach Vol, veh/h		23			151			882			693	
Approach Delay, s/veh		27.4			31.5			15.0			9.4	
Approach LOS		C			C			B			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.8	40.1		12.4	8.0	43.8		12.4				
Change Period (Y+Rc), s	7.3	7.3		* 6.8	7.3	7.3		* 6.8				
Max Green Setting (Gmax), s	12.7	42.7		* 13	12.7	42.7		* 13				
Max Q Clear Time (g_c+I1), s	4.1	23.8		4.3	2.2	13.9		5.6				
Green Ext Time (p_c), s	0.2	9.0		0.0	0.0	7.2		0.3				

Intersection Summary

HCM 6th Ctrl Delay	14.4
HCM 6th LOS	B

Notes

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

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Apartments - Albemarle County, VA
6: Full-movement Driveway

Build (2023) Conditions - No Improvements
Timing Plan: PM Peak Hour

Intersection

Int Delay, s/veh 1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	19	30	759	625	25
Future Vol, veh/h	35	19	30	759	625	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	100	-	-	1
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	21	33	825	679	27

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1570	679	706
Stage 1	679	-	-
Stage 2	891	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	122	452	892
Stage 1	504	-	-
Stage 2	401	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	117	452	892
Mov Cap-2 Maneuver	117	-	-
Stage 1	485	-	-
Stage 2	401	-	-

Approach	EB	NB	SB
HCM Control Delay, s	37	0.3	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	892	-	117	452	-	-
HCM Lane V/C Ratio	0.037	-	0.325	0.046	-	-
HCM Control Delay (s)	9.2	-	49.9	13.3	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.3	0.1	-	-

Queuing and Blocking Report
 Rio Road Apartments - Albemarle County, VA

Build (2023) Conditions - No Improvements

PM Peak Hour

Intersection: 1: Rio Road & John Warner Parkway & CATEC Driveway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	R	LT	R	LT	R
Maximum Queue (ft)	299	1352	400	801	581	32	124	192	28	10
Average Queue (ft)	42	1005	383	422	140	4	82	166	5	1
95th Queue (ft)	180	1623	453	723	407	20	141	211	20	7
Link Distance (ft)		1309		956	956			173	309	
Upstream Blk Time (%)		21		1	0			17		
Queuing Penalty (veh)		0		0	0			133		
Storage Bay Dist (ft)	200		300			500	75			125
Storage Blk Time (%)		53	42		0		28	35		
Queuing Penalty (veh)		309	213		0		197	24		

Intersection: 2: Rio Road & Dunlora Drive

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	123	135	210	93	172
Average Queue (ft)	34	42	146	44	28
95th Queue (ft)	89	108	266	91	128
Link Distance (ft)	523		198		173
Upstream Blk Time (%)			8		1
Queuing Penalty (veh)			65		6
Storage Bay Dist (ft)		200		50	
Storage Blk Time (%)	0	0		14	
Queuing Penalty (veh)	0	0		91	

Intersection: 3: Rio Road & Dunlora Forest Drive

Movement	WB	WB	NB	SB
Directions Served	L	R	R	L
Maximum Queue (ft)	32	30	6	46
Average Queue (ft)	7	9	0	12
95th Queue (ft)	27	30	4	39
Link Distance (ft)	114			
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		25	200	225
Storage Blk Time (%)	4	3		
Queuing Penalty (veh)	1	0		

Intersection: 4: Rio Road & Waldorf School Road/Pen Park Road

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	50	84	91	43	400	225	171	257	14
Average Queue (ft)	14	32	32	6	173	46	50	86	1
95th Queue (ft)	39	66	65	31	328	154	112	197	9
Link Distance (ft)	745		1307		976			545	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		350		75		125	225		100
Storage Blk Time (%)					19			4	
Queuing Penalty (veh)					21			4	

Intersection: 5: Right-in Driveway & Rio Road

Movement	NB	B16	SB
Directions Served	T	T	R
Maximum Queue (ft)	174	230	7
Average Queue (ft)	62	30	0
95th Queue (ft)	176	143	7
Link Distance (ft)	93	174	
Upstream Blk Time (%)	8	2	
Queuing Penalty (veh)	68	20	
Storage Bay Dist (ft)			1
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Full-movement Driveway

Movement	EB	EB	NB	NB	B10	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	83	36	74	100	34	4
Average Queue (ft)	30	12	14	11	5	0
95th Queue (ft)	85	34	49	92	58	4
Link Distance (ft)	370	370		198	273	
Upstream Blk Time (%)			0	1	0	
Queuing Penalty (veh)			0	6	1	
Storage Bay Dist (ft)			100			1
Storage Blk Time (%)			0	1		
Queuing Penalty (veh)			0	0		

Network Summary

Network wide Queuing Penalty: 1159

Rio Road Multi-Family - Albemarle County, VA Build (2023) Conditions w/ median accel lane
 1: Rio Road & John Warner Parkway & CATEC Driveway Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	548	43	553	804	9	142	3	667	4	1	1
Future Volume (veh/h)	14	548	43	553	804	9	142	3	667	4	1	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	16	609	48	614	893	10	158	3	741	4	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	27	1254	99	640	1347	1153	196	4	746	10	3	11
Arrive On Green	0.01	0.38	0.38	0.36	0.72	0.72	0.11	0.11	0.11	0.01	0.01	0.01
Sat Flow, veh/h	1781	3337	263	1781	1870	1585	1750	33	1585	1439	360	1585
Grp Volume(v), veh/h	16	324	333	614	893	10	161	0	741	5	0	1
Grp Sat Flow(s),veh/h/ln	1781	1777	1823	1781	1870	1585	1783	0	1585	1798	0	1585
Q Serve(g_s), s	1.7	26.8	26.9	65.1	49.3	0.3	17.0	0.0	21.6	0.5	0.0	0.1
Cycle Q Clear(g_c), s	1.7	26.8	26.9	65.1	49.3	0.3	17.0	0.0	21.6	0.5	0.0	0.1
Prop In Lane	1.00		0.14	1.00		1.00	0.98		1.00	0.80		1.00
Lane Grp Cap(c), veh/h	27	668	685	640	1347	1153	200	0	746	13	0	11
V/C Ratio(X)	0.60	0.48	0.49	0.96	0.66	0.01	0.81	0.00	0.99	0.39	0.00	0.09
Avail Cap(c_a), veh/h	78	668	685	723	1347	1153	200	0	746	97	0	85
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	94.5	46.0	46.0	60.5	14.4	7.2	83.7	0.0	50.7	95.4	0.0	95.2
Incr Delay (d2), s/veh	19.9	2.5	2.5	22.8	1.2	0.0	21.1	0.0	31.0	18.2	0.0	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	12.5	12.8	33.4	20.8	0.1	9.0	0.0	41.9	0.3	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	114.4	48.5	48.5	83.3	15.7	7.2	104.8	0.0	81.8	113.6	0.0	98.5
LnGrp LOS	F	D	D	F	B	A	F	A	F	F	A	F
Approach Vol, veh/h		673			1517			902			6	
Approach Delay, s/veh		50.0			43.0			85.9			111.1	
Approach LOS		D			D			F			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	76.0	78.0		30.0	9.5	144.5		9.0				
Change Period (Y+Rc), s	* 6.7	* 5.5		* 8.4	6.6	* 5.5		7.6				
Max Green Setting (Gmax), s	* 78	* 55		* 22	8.4	* 1.2E2		10.4				
Max Q Clear Time (g_c+I1), s	67.1	28.9		23.6	3.7	51.3		2.5				
Green Ext Time (p_c), s	2.2	7.5		0.0	0.0	19.2		0.0				

Intersection Summary

HCM 6th Ctrl Delay	57.1
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Multi-Family - Albemarle County, VA Build (2023) Conditions w/ median accel lane
2: Rio Road & Dunlora Drive

Timing Plan: AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	95	76	736	35	55	541
Future Volume (Veh/h)	95	76	736	35	55	541
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	108	86	836	40	63	615
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		8				
Median type			Raised			None
Median storage (veh)			1			
Upstream signal (ft)						259
pX, platoon unblocked						
vC, conflicting volume	1597	856			876	
vC1, stage 1 conf vol	856					
vC2, stage 2 conf vol	741					
vCu, unblocked vol	1597	856			876	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	56	76			92	
cM capacity (veh/h)	243	357			771	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	194	876	63	615		
Volume Left	108	0	63	0		
Volume Right	86	40	0	0		
cSH	436	1700	771	1700		
Volume to Capacity	0.44	0.52	0.08	0.36		
Queue Length 95th (ft)	56	0	7	0		
Control Delay (s)	25.5	0.0	10.1	0.0		
Lane LOS	D		B			
Approach Delay (s)	25.5	0.0	0.9			
Approach LOS	D					
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			57.6%		ICU Level of Service	B
Analysis Period (min)			15			

Rio Road Multi-Family - Albemarle County, VA
3: Rio Road & Dunlora Forest Drive

Build (2023) Conditions w/ median accel lane

Timing Plan: AM Peak Hour

Intersection

Int Delay, s/veh 0.7

Movement WBL WBR NBT NBR SBL SBT

Lane Configurations      

Traffic Vol, veh/h 15 25 700 8 9 637

Future Vol, veh/h 15 25 700 8 9 637

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 25 - 200 225 -

Veh in Median Storage, # 0 - 0 - - 0

Grade, % 0 - 0 - - 0

Peak Hour Factor 90 90 90 90 90 90

Heavy Vehicles, % 2 2 2 2 2 2

Mvmt Flow 17 28 778 9 10 708

Major/Minor Minor1 Major1 Major2

Conflicting Flow All 1506 778 0 0 787 0

Stage 1 778 - - - - -

Stage 2 728 - - - - -

Critical Hdwy 6.42 6.22 - - 4.12 -

Critical Hdwy Stg 1 5.42 - - - - -

Critical Hdwy Stg 2 5.42 - - - - -

Follow-up Hdwy 3.518 3.318 - - 2.218 -

Pot Cap-1 Maneuver 133 396 - - 832 -

Stage 1 453 - - - - -

Stage 2 478 - - - - -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 131 396 - - 832 -

Mov Cap-2 Maneuver 131 - - - - -

Stage 1 453 - - - - -

Stage 2 472 - - - - -

Approach WB NB SB

HCM Control Delay, s 22.9 0 0.1

HCM LOS C

Minor Lane/Major Mvmt NBT NBRWBLn1WBLn2 SBL SBT

Capacity (veh/h) - - 131 396 832 -

HCM Lane V/C Ratio - - 0.127 0.07 0.012 -

HCM Control Delay (s) - - 36.4 14.8 9.4 -

HCM Lane LOS - - E B A -

HCM 95th %tile Q(veh) - - 0.4 0.2 0 -

Rio Road Multi-Family - Albemarle County, VA Build (2023) Conditions w/ median accel lane
4: Rio Road & Waldorf School Road/Pen Park Road Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	2	56	163	1	202	78	483	122	154	460	38
Future Volume (veh/h)	23	2	56	163	1	202	78	483	122	154	460	38
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	29	3	72	209	1	259	100	619	156	197	590	49
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	65	33	74	240	1	295	366	784	665	358	843	714
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.06	0.42	0.42	0.09	0.45	0.45
Sat Flow, veh/h	0	177	399	745	4	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	104	0	0	210	0	259	100	619	156	197	590	49
Grp Sat Flow(s),veh/h/ln	576	0	0	749	0	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	11.3	2.2	20.3	4.5	4.3	17.9	1.2
Cycle Q Clear(g_c), s	13.2	0.0	0.0	13.2	0.0	11.3	2.2	20.3	4.5	4.3	17.9	1.2
Prop In Lane	0.28		0.69	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	172	0	0	241	0	295	366	784	665	358	843	714
V/C Ratio(X)	0.60	0.00	0.00	0.87	0.00	0.88	0.27	0.79	0.23	0.55	0.70	0.07
Avail Cap(c_a), veh/h	172	0	0	241	0	295	577	1128	956	513	1128	956
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.5	0.0	0.0	31.0	0.0	28.0	12.1	17.8	13.2	13.6	15.6	11.0
Incr Delay (d2), s/veh	5.8	0.0	0.0	27.4	0.0	24.3	0.4	2.5	0.2	1.3	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	0.0	5.3	0.0	6.0	0.8	8.2	1.5	1.6	6.9	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.3	0.0	0.0	58.4	0.0	52.3	12.5	20.3	13.4	14.9	16.9	11.1
LnGrp LOS	C	A	A	E	A	D	B	C	B	B	B	B
Approach Vol, veh/h		104			469			875			836	
Approach Delay, s/veh		31.3			55.0			18.2			16.1	
Approach LOS		C			E			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.8	37.0		20.0	11.6	39.2		20.0				
Change Period (Y+Rc), s	7.3	7.3		* 6.8	7.3	7.3		* 6.8				
Max Green Setting (Gmax), s	12.7	42.7		* 13	12.7	42.7		* 13				
Max Q Clear Time (g_c+I1), s	6.3	22.3		15.2	4.2	19.9		15.2				
Green Ext Time (p_c), s	0.4	7.3		0.0	0.2	7.0		0.0				

Intersection Summary

HCM 6th Ctrl Delay	25.6
HCM 6th LOS	C

Notes

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

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Multi-Family - Albemarle County, VA Build (2023) Conditions w/ median accel lane
6: Full-movement Driveway

Timing Plan: AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	30	11	714	616	9
Future Volume (Veh/h)	57	30	11	714	616	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	1.00	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	30	12	776	670	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				Raised	Raised	
Median storage veh				1	1	
Upstream signal (ft)				1211	908	
pX, platoon unblocked	0.75					
vC, conflicting volume	1470	670	680			
vC1, stage 1 conf vol	670					
vC2, stage 2 conf vol	800					
vCu, unblocked vol	1460	670	680			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	76	93	99			
cM capacity (veh/h)	258	457	912			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	62	30	12	776	670	10
Volume Left	62	0	12	0	0	0
Volume Right	0	30	0	0	0	10
cSH	258	457	912	1700	1700	1700
Volume to Capacity	0.24	0.07	0.01	0.46	0.39	0.01
Queue Length 95th (ft)	23	5	1	0	0	0
Control Delay (s)	23.3	13.4	9.0	0.0	0.0	0.0
Lane LOS	C	B	A			
Approach Delay (s)	20.1		0.1		0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			47.6%		ICU Level of Service	A
Analysis Period (min)			15			

Queuing and Blocking Report
 Rio Road Multi-Family - Albemarle County, VA

Build (2023) Conditions w/ median accel lane
 AM Peak Hour

Intersection: 1: Rio Road & John Warner Parkway & CATEC Driveway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	R	LT	R	LT	R
Maximum Queue (ft)	233	424	390	595	488	26	179	178	13	2
Average Queue (ft)	24	245	215	288	172	1	128	123	1	0
95th Queue (ft)	116	370	345	504	372	11	196	206	8	1
Link Distance (ft)		1303		950	950		164	164	308	
Upstream Blk Time (%)				0	0		11	4		
Queuing Penalty (veh)				0	0		45	15		
Storage Bay Dist (ft)	200		300			500				125
Storage Blk Time (%)		21	2		0					
Queuing Penalty (veh)		71	5		0					

Intersection: 2: Rio Road & Dunlora Drive

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	150	139	228	84	12
Average Queue (ft)	52	50	90	30	0
95th Queue (ft)	111	107	238	68	13
Link Distance (ft)	508		215		164
Upstream Blk Time (%)			4		
Queuing Penalty (veh)			31		
Storage Bay Dist (ft)		200		100	
Storage Blk Time (%)	0			0	
Queuing Penalty (veh)	0			2	

Intersection: 3: Rio Road & Dunlora Forest Drive

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	46	39	37
Average Queue (ft)	12	13	5
95th Queue (ft)	36	32	24
Link Distance (ft)	124		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		25	225
Storage Blk Time (%)	10	5	
Queuing Penalty (veh)	3	1	

Intersection: 4: Rio Road & Waldorf School Road/Pen Park Road

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	124	215	172	166	382	195	220	362	142
Average Queue (ft)	47	94	57	40	151	42	66	134	15
95th Queue (ft)	106	187	121	107	287	126	153	280	75
Link Distance (ft)	746		1307		976			558	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		350		75		125	225		100
Storage Blk Time (%)		0	0	1	21			9	
Queuing Penalty (veh)		1	0	4	45			18	

Intersection: 5: Right-in Driveway & Rio Road

Movement	NB	B16	B16
Directions Served	T	T	
Maximum Queue (ft)	161	89	94
Average Queue (ft)	29	11	8
95th Queue (ft)	128	73	82
Link Distance (ft)	115	160	160
Upstream Blk Time (%)	3	1	1
Queuing Penalty (veh)	23	5	5
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Full-movement Driveway

Movement	EB	EB	NB	NB	B10	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	75	57	40	56	37	4
Average Queue (ft)	32	20	7	5	3	0
95th Queue (ft)	60	49	28	61	43	3
Link Distance (ft)	362	362		189	256	
Upstream Blk Time (%)				1		
Queuing Penalty (veh)				4		
Storage Bay Dist (ft)			100			1
Storage Blk Time (%)				1		
Queuing Penalty (veh)				0		

Network Summary

Network wide Queuing Penalty: 276

Rio Road Apartments - Albemarle County, VA Build (2023) Conditions w/ median accel lane
 1: Rio Road & John Warner Parkway & CATEC Driveway Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	974	74	649	741	31	63	5	697	6	2	4
Future Volume (veh/h)	17	974	74	649	741	31	63	5	697	6	2	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	18	1047	80	698	797	33	68	5	749	6	2	4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	29	1102	84	713	1336	1151	186	14	812	17	6	19
Arrive On Green	0.02	0.33	0.33	0.40	0.71	0.71	0.11	0.11	0.11	0.01	0.01	0.01
Sat Flow, veh/h	1781	3346	256	1781	1870	1585	1665	122	1585	1352	451	1585
Grp Volume(v), veh/h	18	556	571	698	797	33	73	0	749	8	0	4
Grp Sat Flow(s),veh/h/ln	1781	1777	1824	1781	1870	1585	1787	0	1585	1803	0	1585
Q Serve(g_s), s	1.9	58.9	59.0	74.6	41.0	1.1	7.3	0.0	21.6	0.8	0.0	0.5
Cycle Q Clear(g_c), s	1.9	58.9	59.0	74.6	41.0	1.1	7.3	0.0	21.6	0.8	0.0	0.5
Prop In Lane	1.00		0.14	1.00		1.00	0.93		1.00	0.75		1.00
Lane Grp Cap(c), veh/h	29	585	601	713	1336	1151	200	0	812	22	0	19
V/C Ratio(X)	0.63	0.95	0.95	0.98	0.60	0.03	0.36	0.00	0.92	0.36	0.00	0.21
Avail Cap(c_a), veh/h	78	585	601	723	1336	1151	200	0	812	97	0	85
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	94.4	63.1	63.2	57.1	13.7	7.4	79.4	0.0	43.6	94.6	0.0	94.4
Incr Delay (d2), s/veh	20.6	26.6	26.3	28.1	0.7	0.0	1.1	0.0	16.0	9.6	0.0	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	30.9	31.7	38.9	17.2	0.4	3.4	0.0	36.6	0.5	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	115.0	89.7	89.4	85.2	14.5	7.4	80.5	0.0	59.5	104.2	0.0	99.5
LnGrp LOS	F	F	F	F	B	A	F	A	E	F	A	F
Approach Vol, veh/h		1145			1528			822			12	
Approach Delay, s/veh		90.0			46.6			61.4			102.6	
Approach LOS		F			D			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	83.9	69.1		30.0	9.7	143.3		10.0				
Change Period (Y+Rc), s	* 6.7	* 5.5		* 8.4	6.6	* 5.5		7.6				
Max Green Setting (Gmax), s	* 78	* 55		* 22	8.4	* 1.2E2		10.4				
Max Q Clear Time (g_c+I1), s	76.6	61.0		23.6	3.9	43.0		2.8				
Green Ext Time (p_c), s	0.6	0.0		0.0	0.0	15.5		0.0				

Intersection Summary

HCM 6th Ctrl Delay	64.4
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Apartments - Albemarle County, VA
2: Rio Road & Dunlora Drive

Build (2023) Conditions w/ median accel lane

Timing Plan: PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	38	31	734	60	83	642
Future Volume (Veh/h)	38	31	734	60	83	642
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	41	33	789	65	89	690
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		8				
Median type			Raised			None
Median storage veh			1			
Upstream signal (ft)						262
pX, platoon unblocked						
vC, conflicting volume	1690	822			854	
vC1, stage 1 conf vol	822					
vC2, stage 2 conf vol	868					
vCu, unblocked vol	1690	822			854	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	81	91			89	
cM capacity (veh/h)	222	374			785	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	74	854	89	690		
Volume Left	41	0	89	0		
Volume Right	33	65	0	0		
cSH	400	1700	785	1700		
Volume to Capacity	0.19	0.50	0.11	0.41		
Queue Length 95th (ft)	17	0	10	0		
Control Delay (s)	20.7	0.0	10.2	0.0		
Lane LOS	C		B			
Approach Delay (s)	20.7	0.0	1.2			
Approach LOS	C					
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			60.2%		ICU Level of Service	B
Analysis Period (min)			15			

Rio Road Apartments - Albemarle County, VA
3: Rio Road & Dunlora Forest Road

Build (2023) Conditions w/ median accel lane
Timing Plan: PM Peak Hour

Intersection

Int Delay, s/veh 0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	12	777	10	21	623
Future Vol, veh/h	8	12	777	10	21	623
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	25	-	200	225	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	13	863	11	23	692

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1601	863	0
Stage 1	863	-	-
Stage 2	738	-	-
Critical Hdwy	6.42	6.22	-
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	-
Pot Cap-1 Maneuver	117	354	-
Stage 1	413	-	-
Stage 2	473	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	113	354	-
Mov Cap-2 Maneuver	113	-	-
Stage 1	413	-	-
Stage 2	459	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.2	0	0.3
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	-	- 113 354	772	-
HCM Lane V/C Ratio	-	- 0.079 0.038	0.03	-
HCM Control Delay (s)	-	- 39.6 15.6	9.8	-
HCM Lane LOS	-	- E C	A	-
HCM 95th %tile Q(veh)	-	- 0.3 0.1	0.1	-

Rio Road Apartments - Albemarle County, VA Build (2023) Conditions w/ median accel lane
 4: Rio Road & Waldorf School Road/Pen Park Road Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1	12	54	1	83	8	696	98	117	510	4
Future Volume (veh/h)	8	1	12	54	1	83	8	696	98	117	510	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	9	1	13	59	1	91	9	765	108	129	560	4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	29	76	240	3	138	458	954	808	345	1063	901
Arrive On Green	0.09	0.09	0.09	0.09	0.09	0.09	0.01	0.51	0.51	0.07	0.57	0.57
Sat Flow, veh/h	336	336	873	1477	36	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	23	0	0	60	0	91	9	765	108	129	560	4
Grp Sat Flow(s),veh/h/ln	1544	0	0	1513	0	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.6	0.0	3.6	0.2	21.8	2.3	2.1	11.9	0.1
Cycle Q Clear(g_c), s	2.3	0.0	0.0	2.2	0.0	3.6	0.2	21.8	2.3	2.1	11.9	0.1
Prop In Lane	0.39		0.57	0.98		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	212	0	0	243	0	138	458	954	808	345	1063	901
V/C Ratio(X)	0.11	0.00	0.00	0.25	0.00	0.66	0.02	0.80	0.13	0.37	0.53	0.00
Avail Cap(c_a), veh/h	386	0	0	409	0	326	789	1243	1053	572	1243	1053
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.1	0.0	0.0	27.7	0.0	28.4	7.9	13.1	8.3	10.8	8.5	6.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.5	0.0	5.3	0.0	2.9	0.1	0.7	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.0	0.9	0.0	1.5	0.1	8.1	0.7	0.7	3.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.4	0.0	0.0	28.2	0.0	33.7	7.9	16.0	8.4	11.4	9.0	6.0
LnGrp LOS	C	A	A	C	A	C	A	B	A	B	A	A
Approach Vol, veh/h		23			151			882			693	
Approach Delay, s/veh		27.4			31.5			15.0			9.4	
Approach LOS		C			C			B			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.8	40.1		12.4	8.0	43.8		12.4				
Change Period (Y+Rc), s	7.3	7.3		* 6.8	7.3	7.3		* 6.8				
Max Green Setting (Gmax), s	12.7	42.7		* 13	12.7	42.7		* 13				
Max Q Clear Time (g_c+I1), s	4.1	23.8		4.3	2.2	13.9		5.6				
Green Ext Time (p_c), s	0.2	9.0		0.0	0.0	7.2		0.3				

Intersection Summary

HCM 6th Ctrl Delay	14.4
HCM 6th LOS	B

Notes

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

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Rio Road Apartments - Albemarle County, VA
6: Full-movement Driveway

Build (2023) Conditions w/ median accel lane

Timing Plan: PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	19	30	759	625	25
Future Volume (Veh/h)	35	19	30	759	625	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	21	33	825	679	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				Raised	Raised	
Median storage veh				1	1	
Upstream signal (ft)				1217	901	
pX, platoon unblocked	0.67					
vC, conflicting volume	1570	679	706			
vC1, stage 1 conf vol	679					
vC2, stage 2 conf vol	891					
vCu, unblocked vol	1605	679	706			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	83	95	96			
cM capacity (veh/h)	223	452	892			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	38	21	33	825	679	27
Volume Left	38	0	33	0	0	0
Volume Right	0	21	0	0	0	27
cSH	223	452	892	1700	1700	1700
Volume to Capacity	0.17	0.05	0.04	0.49	0.40	0.02
Queue Length 95th (ft)	15	4	3	0	0	0
Control Delay (s)	24.4	13.4	9.2	0.0	0.0	0.0
Lane LOS	C	B	A			
Approach Delay (s)	20.5		0.4		0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			49.9%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection: 1: Rio Road & John Warner Parkway & CATEC Driveway

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	R	LT	R	LT	R
Maximum Queue (ft)	254	1341	400	816	536	33	164	183	22	5
Average Queue (ft)	34	928	375	439	132	5	78	164	3	0
95th Queue (ft)	153	1599	469	732	365	22	144	214	15	3
Link Distance (ft)		1303		950	950		174	174	308	
Upstream Blk Time (%)		19		0	0		1	16		
Queuing Penalty (veh)		0		0	0		3	63		
Storage Bay Dist (ft)	200		300			500				125
Storage Blk Time (%)		51	38		0					
Queuing Penalty (veh)		297	194		0					

Intersection: 2: Rio Road & Dunlora Drive

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	75	101	210	130	154
Average Queue (ft)	26	34	137	48	8
95th Queue (ft)	58	79	263	104	69
Link Distance (ft)	512		198		174
Upstream Blk Time (%)			7		0
Queuing Penalty (veh)			54		1
Storage Bay Dist (ft)		200		100	
Storage Blk Time (%)				3	
Queuing Penalty (veh)				19	

Intersection: 3: Rio Road & Dunlora Forest Road

Movement	WB	WB	NB	SB
Directions Served	L	R	R	L
Maximum Queue (ft)	37	29	6	53
Average Queue (ft)	9	9	0	11
95th Queue (ft)	32	29	4	38
Link Distance (ft)	128			
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		25	200	225
Storage Blk Time (%)	8	3		
Queuing Penalty (veh)	1	0		

Intersection: 4: Rio Road & Waldorf School Road/Pen Park Road

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	52	80	83	71	440	209	126	224	20
Average Queue (ft)	17	32	34	6	178	40	51	86	1
95th Queue (ft)	45	67	64	38	355	128	100	187	8
Link Distance (ft)	748		1307		976			542	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		350		75		125	225		100
Storage Blk Time (%)					20			4	
Queuing Penalty (veh)					21			4	

Intersection: 5: Right-in Driveway & Rio Road

Movement	NB	B16	B16
Directions Served	T	T	
Maximum Queue (ft)	201	142	134
Average Queue (ft)	57	18	12
95th Queue (ft)	184	91	92
Link Distance (ft)	121	147	147
Upstream Blk Time (%)	5	1	1
Queuing Penalty (veh)	41	3	3
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Full-movement Driveway

Movement	EB	EB	NB	NB	B10	SB	SB
Directions Served	L	R	L	T	T	T	R
Maximum Queue (ft)	62	27	63	47	3	2	11
Average Queue (ft)	21	9	16	3	0	0	0
95th Queue (ft)	49	25	49	35	3	2	7
Link Distance (ft)	364	364		198	266	147	
Upstream Blk Time (%)				0			
Queuing Penalty (veh)				0			
Storage Bay Dist (ft)			100				1
Storage Blk Time (%)			0	0			0
Queuing Penalty (veh)			1	0			0

Network Summary

Network wide Queuing Penalty: 705