

To: Tom Leininger, James City County
From: Steve Schmidt, PE, PTOE
RE: Chickahominy Riverfront Park Traffic Analysis
Date: July 31, 2021
Revised October 29, 2021
Copy: Scott Dunn AICP, PTP (TG), Megan Lowther (TG)

As requested, Timmons Group has prepared a revised traffic assessment for the proposed Chickahominy Riverfront Park Master Plan Update in James City County, Virginia. The site is located along the north side of John Tyler Highway (Route 5) just east of the Chickahominy River Bridge as shown on Figure 1 (all figures are located at the end of this memorandum).

The initial assessment was submitted to VDOT on July 31, 2021 and has been revised based on VDOT comments regarding the site trip distribution.

The 140-acre park currently offers swimming, camping, boat launches, fishing docks and river access (among others) with access provided via one entrance on John Tyler Highway as shown on Figure 2.

The proposed Master Plan will improve the park with incremental increases in the number of camping spaces, parking spaces, boat launches, etc. It is not anticipated the additional uses will be a significantly increase the vehicular traffic to/from the park. For the purposes of this analysis, full buildout of the park was assumed to be 2026.

This assessment analyzes the existing and future traffic to the park to determine if any improvements are required at the site entrance.

Existing Conditions

John Tyler Highway is a two-lane, undivided minor arterial with a posted speed limit of 55 mph. According to the 2019 VDOT count book, John Tyler Highway services 3,600 vehicles per day in the vicinity of the site. A paved multiuse path runs parallel to John Tyler Highway.

John Tyler Highway serves as a major east-west connector and runs from Richmond to Williamsburg.

The existing roadway geometry at the site entrance is shown on Figure 3.

Existing Traffic Volumes

Existing PM and Saturday peak hour traffic counts were conducted on Thursday April 15, 2021 between 4-6 PM (PM peak hour) and Saturday, April 17, 2021 between 12-2 PM (SAT peak hour). The counts included heavy vehicles by movement, pedestrian, and bicycle counts and are included in Appendix A.

The existing PM and SAT peak hour counts indicate the PM peak hour occurs from 4:45 PM – 5:45 PM and the SAT peak hour occurs from 12:15 PM – 1:15 PM.

Due to the change in traffic patterns associated with the ongoing pandemic, the counts were compared to 2019 VDOT AADT counts to determine the adjustment factor necessary to bring the 2021 counts to expected levels. After comparison it was determined that the volumes on John Tyler Highway are **10% lower** than the expected 2021 volumes. Therefore, the existing traffic counts were increased by 10% along John Tyler Highway.

Given the nature of the park, the traffic volumes differ from month to month based on the season. The County provided historic entrance counts for the park which indicate the peak month (July) experiences 92% more traffic than the month the count was completed (April). Therefore, the traffic counts into and out of the park entrance were increased by 92% to accommodate the peak traffic month.

The total adjusted 2021 Existing Volumes are shown on Figure 4.

2026 Future Traffic Volumes

As noted above, the Master Plan upgrades to the park are not expected to significantly increase the traffic into and out of the park.

However, it is anticipated that traffic on John Tyler Highway will experience growth during that timeframe. In order to account for the increase in traffic, the existing counts shown on Figure 4 were grown by an annual 2% growth rate for the five (5) year period for project buildout. This growth was applied to all movements to represent a conservative (or worst case) analysis.

The 2% annual growth rate was compounded annually over the five (5) year period and was applied to all movements from the existing traffic counts.

Further, at the request of VDOT, it was assumed that 5% of the entering PM peak hour traffic would make an eastbound left turn into the site. This results in 4 left turns in the PM peak hour.

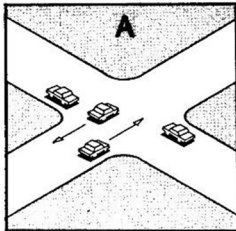
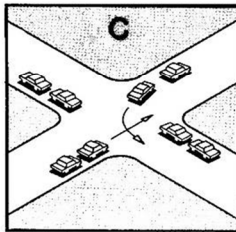
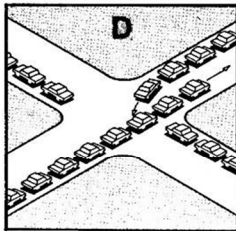
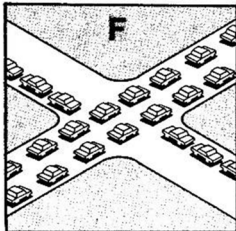
The resulting 2026 future traffic volumes are shown on Figure 5.

Operational and Queuing Analysis

An operational and queuing analysis was completed for the site entrance under existing and future traffic conditions.

Capacity analysis allows traffic engineers to determine the impacts of traffic on the surrounding roadway network. The Transportation Research Board's (TRB) Highway Capacity Manual (HCM) methodologies govern how the capacity analyses are conducted and how the results are interpreted. There are six letter grades of Levels of Service (LOS) from A to F, with LOS A representing the best operating conditions and LOS F the worst operating conditions. Table 1 shows in detail how each of these levels of service are interpreted.

Table 1: Level of Service Definitions

Level of Service	Roadway Segments or Controlled Access Highways	Intersections	
A	Free flow, low traffic density.	No vehicle waits longer than one signal indication.	
B	Delay is not unreasonable, stable traffic flow.	On a rare occasion motorists wait through more than one signal indication.	
C	Stable condition, movements somewhat restricted due to higher volumes, but not objectionable for motorists.	Intermittently drivers wait through more than one signal indication, and occasionally backups may develop behind left turning vehicles, traffic flow still stable and acceptable.	
D	Movements more restricted, queues and delays may occur during short peaks, but lower demands occur often enough to permit clearing, thus preventing excessive backups.	Delays at intersections may become extensive with some, especially left-turning vehicles waiting two or more signal indications, but enough cycles with lower demand occur to permit periodic clearance, thus preventing excessive backups.	
E	Actual capacity of the roadway involves delay to all motorists due to congestion.	Very long queues may create lengthy delays, especially for left-turning vehicles.	
F	Forced flow with demand volumes greater than capacity resulting in complete congestion. Volumes drop to zero in extreme cases.	Backups from locations downstream restrict or prevent movement of vehicles out of approach creating a storage area during part or all of an hour.	

SOURCE: "A Policy on Design of Design of Urban Highways and Arterial Streets" - AASHTO, 1973 based upon material published in "Highway Capacity Manual", National Academy of Sciences, 1965.

For signalized and unsignalized intersections, level of service is defined in terms of **delay**, a measure of driver discomfort, frustration, fuel consumption and lost travel time. Table 2 summarizes the delay associated with each LOS category:

Table 2: Signalized and Unsignalized Intersection Level of Service Criteria

Signalized Intersections		Unsignalized Intersections	
Level of Service	Control Delay per Vehicle (sec/veh)	Level of Service	Average Control Delay (sec/veh)
A	≤ 10	A	0 to 10
B	> 10 to ≤ 20	B	> 10 to ≤ 15
C	> 20 to ≤ 35	C	> 15 to ≤ 25
D	> 35 to ≤ 55	D	> 25 to ≤ 35
E	> 55 to ≤ 80	E	> 35 to ≤ 50
F	> 80	F	> 50

Source: Exhibit 16-2 and Exhibit 17-2 from TRB's "Highway Capacity Manual 2000"

Operational Analysis for 2021 Existing Traffic Volumes

Table 3 summarizes the 2021 existing intersection LOS, delay, 95th percentile queue lengths (Synchro), and maximum queue lengths (SimTraffic) based on the adjusted 2021 existing peak hour traffic volumes shown on Figure 4 and the existing lane geometry shown on Figure 3. The corresponding analysis worksheets are included in Appendix B.

Table 3: 2021 Existing Conditions Level of Service and Queues

Intersection and Type of Control	Movement and Approach	Effective Turn Lane Storage (ft)	PM Peak Hour				Saturday Peak Hour			
			Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Maximum Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Maximum Queue Length (ft)
1. John Tyler Highway (E-W) at Park Entrance (S) <i>Unsignalized</i>	SB Left-Right		11.6	B	13	61	12.5	B	10	60
	<i>NB Approach</i>		11.6	B	--	--	12.5	B	--	--
	EB Left-Thru		0.0	A	0	0	7.8	A	3	54
	<i>EB Approach</i>		0.0	A	--	--	0.1	A	--	--
	WB Thru-Right		†	†	0	0	†	†	--	--
	<i>WB Approach</i>		†	†	--	--	†	†	--	--

¹ Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

As shown on Table 3, under 2021 existing conditions, traffic entering the site operates a LOS A during both the PM and Saturday peak hours. Traffic exiting the site operates at a LOS B during both the PM and Saturday peak hours. There are no queuing concerns at the site entrance.

Operational Analysis for 2026 Future Volume Conditions

Table 4 summarizes the 2026 future intersection LOS, delay, 95th percentile queue lengths (Synchro), and maximum queue lengths (SimTraffic) based on the 2026 future peak hour traffic volumes shown on Figure 5 and the existing lane geometry shown on Figure 3. The corresponding analysis worksheets are included in Appendix C.

Table 4: 2026 Total Future Conditions Level of Service and Queues

Intersection and Type of Control	Movement and Approach	Effective Turn Lane Storage (ft)	PM Peak Hour				Saturday Peak Hour			
			Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Maximum Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Maximum Queue Length (ft)
1. John Tyler Highway (E-W) at Park Entrance (S) <i>Unsignalized</i>	SB Left-Right		12.4	B	15	63	13.3	B	13	63
	<i>NB Approach</i>		12.4	B	--	--	13.3	B	--	--
	EB Left-Thru		7.9	A	0	22	7.8	A	3	57
	<i>EB Approach</i>		0.3	A	--	--	0.1	A	--	--
	WB Thru-Right		†	†	0	0	†	†	--	--
	<i>WB Approach</i>		†	†	--	--	†	†	--	--

¹ Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

As shown on Table 4, under 2026 future conditions, traffic entering the site will continue to operate at a LOS A during both the PM and Saturday peak hours. Traffic exiting the site will continue to operate at a LOS B during both the PM and Saturday peak hours. There will be no queuing concerns at the site entrance.

No improvements are required from a capacity/queueing standpoint to accommodate the site traffic in 2021 or 2026.

Turn Lane Warrant Analysis

Turn lane warrant analyses were completed for the site entrance under 2021 existing and 2026 future traffic conditions.

The analyses were completed using Figure 4 (2021 Existing Volumes) and Figure 5 (2026 Future Traffic Volumes) and the appropriate left and right turn lane nomographs from Appendix F of the VDOT Road Design Manual.

The analyses are shown on Figures 6-10 and indicate the following:

2021 Existing Conditions

- A westbound right turn taper only **is** warranted under 2021 existing traffic conditions. There is existing pavement at the site entrance that can accommodate the taper with restriping.
- An eastbound left turn lane **is not** warranted under 2021 existing traffic conditions.

2026 Future Conditions

Should traffic increase at 2%/year over the next 5 years and 5% of the entering PM peak hour traffic make an eastbound left turn into the site,

- A full westbound right turn lane and taper **will be** warranted under 2026 future traffic conditions. Widening along John Tyler Highway will be required to construct the turn lane.
- An eastbound left turn lane **will not be** warranted under 2026 future traffic conditions.

A sensitivity analysis was completed to determine at what level of traffic a left turn lane would be required at the site entrance. As shown on Figure 11, Saturday peak hour traffic would need to increase by 35% (above the existing peak month traffic) for a left turn lane to be warranted.

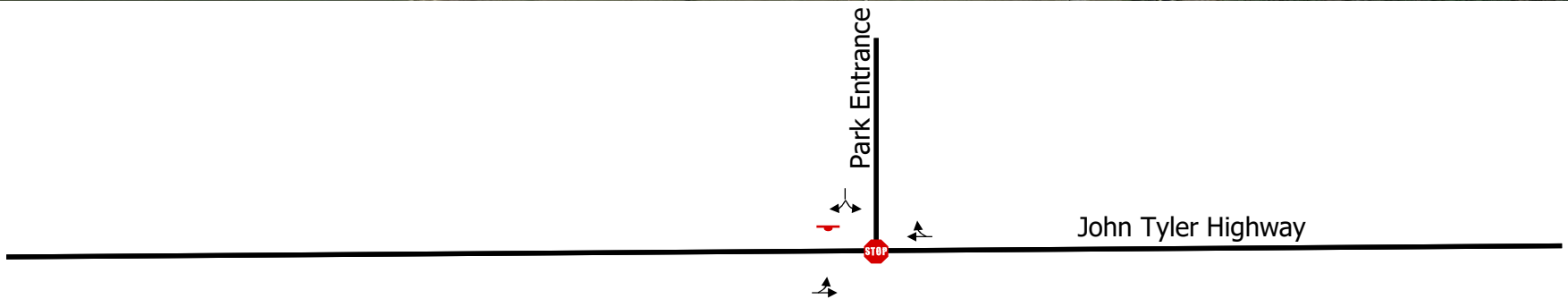
Conclusions

Based on the analysis, the following conclusions are offered:

1. No improvements are required at the site entrance to Chickahominy Riverfront Park from a capacity or queuing standpoint. Under existing and future traffic conditions, all movements operate at LOS B or better with no queuing concerns.
2. A right turn taper on westbound John Tyler Highway is warranted under existing conditions at the site entrance.
3. Should traffic along John Tyler Highway increase at 2%/year, a right turn lane on westbound John Tyler Highway will be warranted at the site entrance.
4. A left turn lane on eastbound John Tyler Highway is not warranted at the site entrance under existing or future traffic conditions.







LEGEND:

- Existing Road
- Lane Configuration
- Stop Controlled Intersection
- Stop Sign Location

NOT TO SCALE

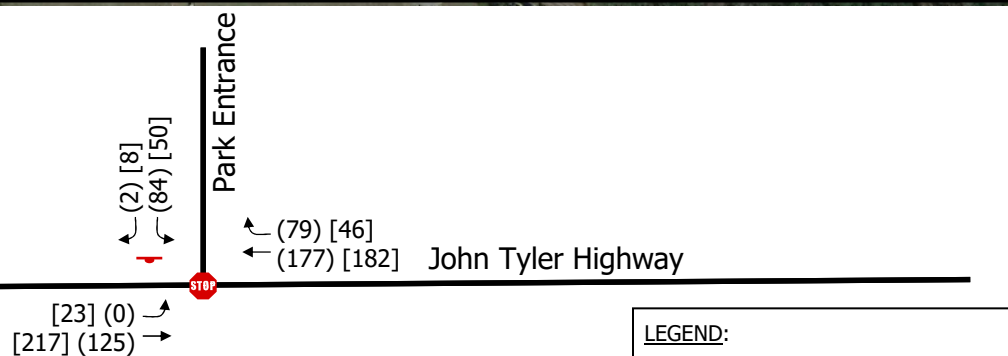


Existing Geometry
Chickahominy Riverfront Park
James City Count, Virginia

Figure
3



Peak Hours:
 Weekday PM: 4:45 – 5:45 PM
 Saturday: 12:15 – 1:15 PM



- LEGEND:**
- Existing Road
 - ↔ Lane Configuration
 - STOP Stop Controlled Intersection
 - ↓ Stop Sign Location
 - (00) PM Peak Hour Volume
 - [00] Sat Peak Hour Volume

NOT TO SCALE

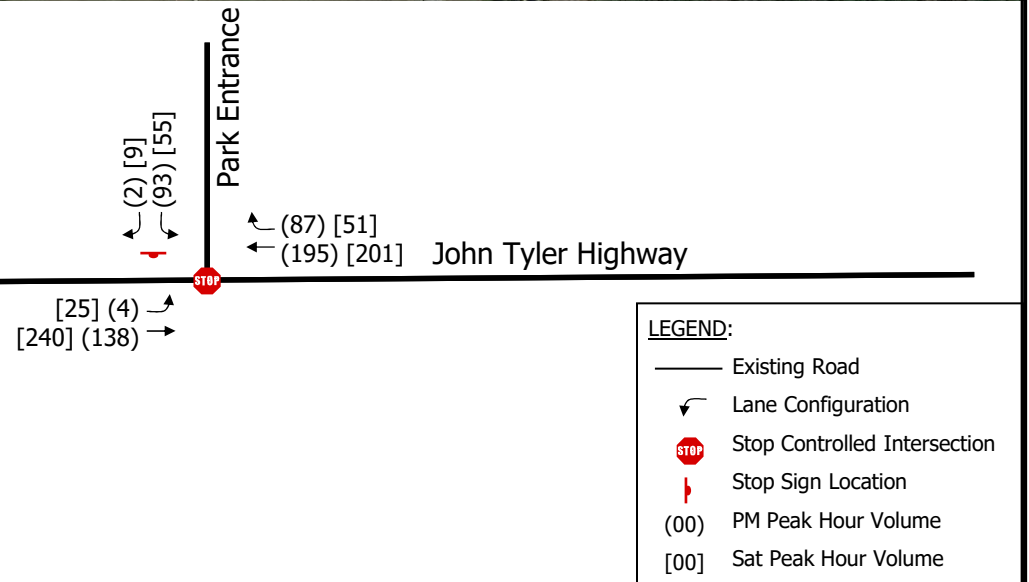


2021 Existing Peak Hour Volumes – Adjusted
 Chickahominy Riverfront Park
 James City County, Virginia

Figure
 4



Peak Hours:
 Weekday PM: 4:45 – 5:45 PM
 Saturday: 12:15 – 1:15 PM



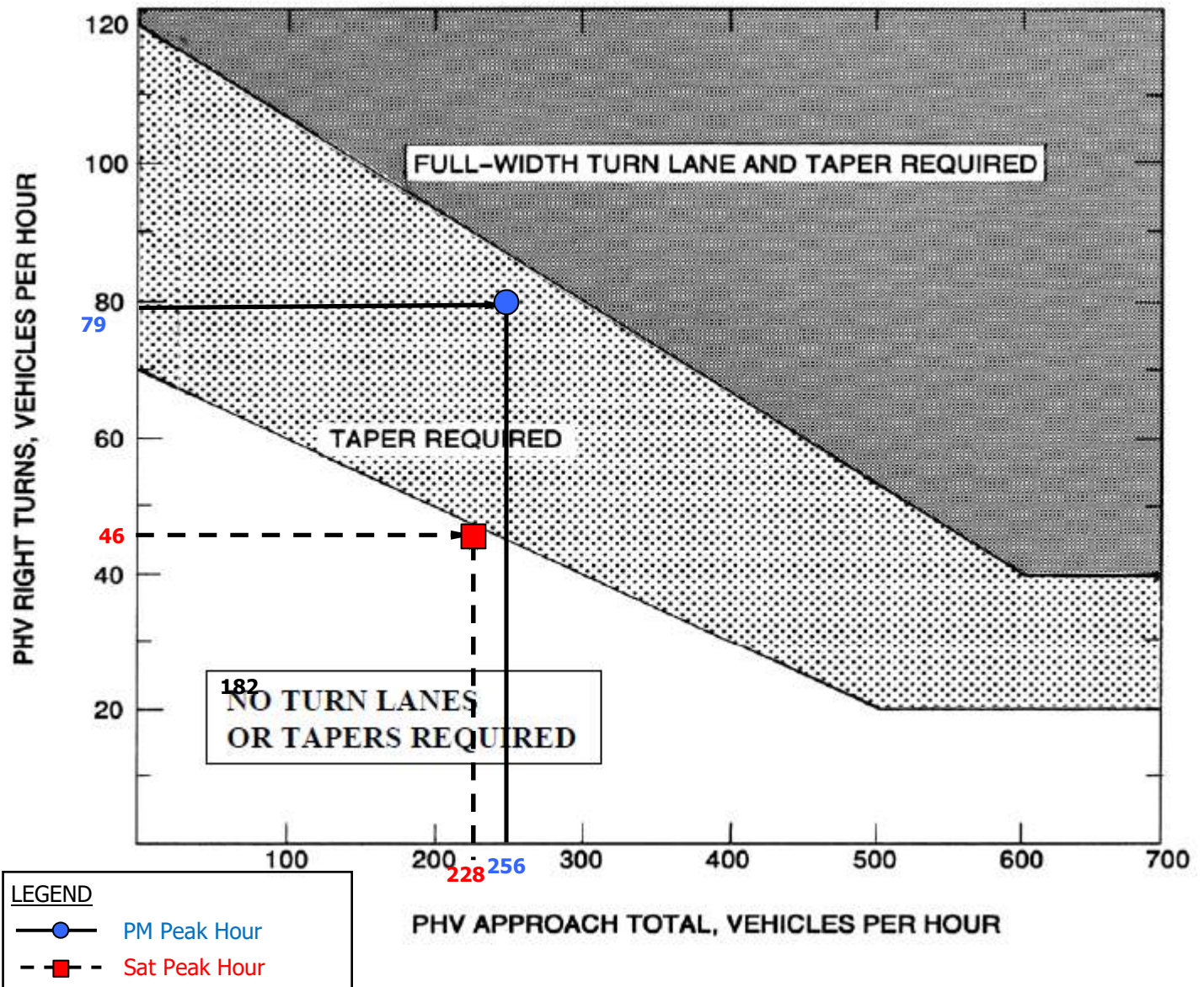
NOT TO SCALE



2026 Future Peak Hour Volumes – Adjusted Chickahominy Riverfront Park James City County, Virginia

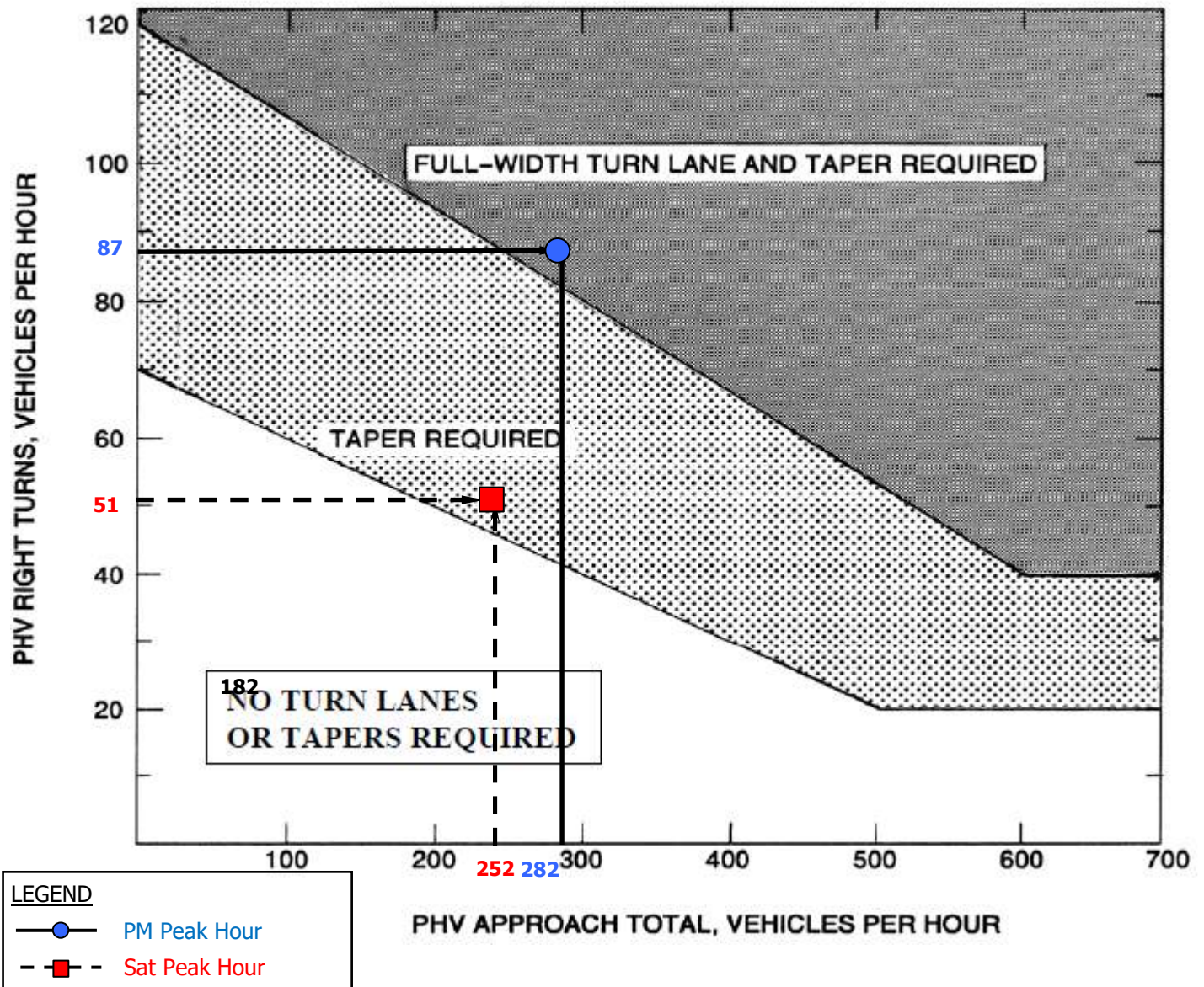
Figure
 5

GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)
FIGURE 3-26 VDOT ROAD DESIGN MANUAL APPENDIX F



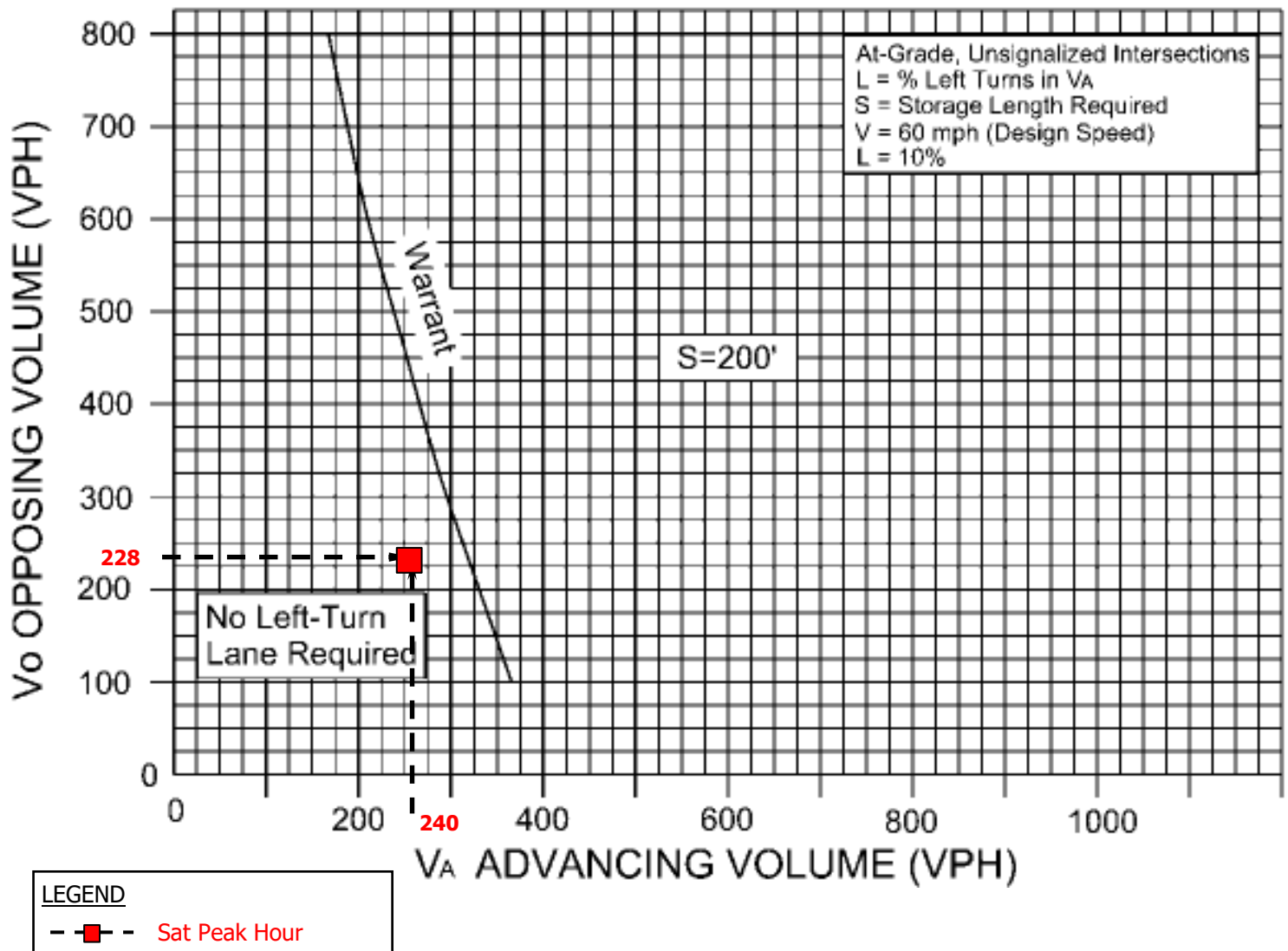
Results:
Westbound Right Turn Lane Taper Warranted

GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)
FIGURE 3-26 VDOT ROAD DESIGN MANUAL APPENDIX F

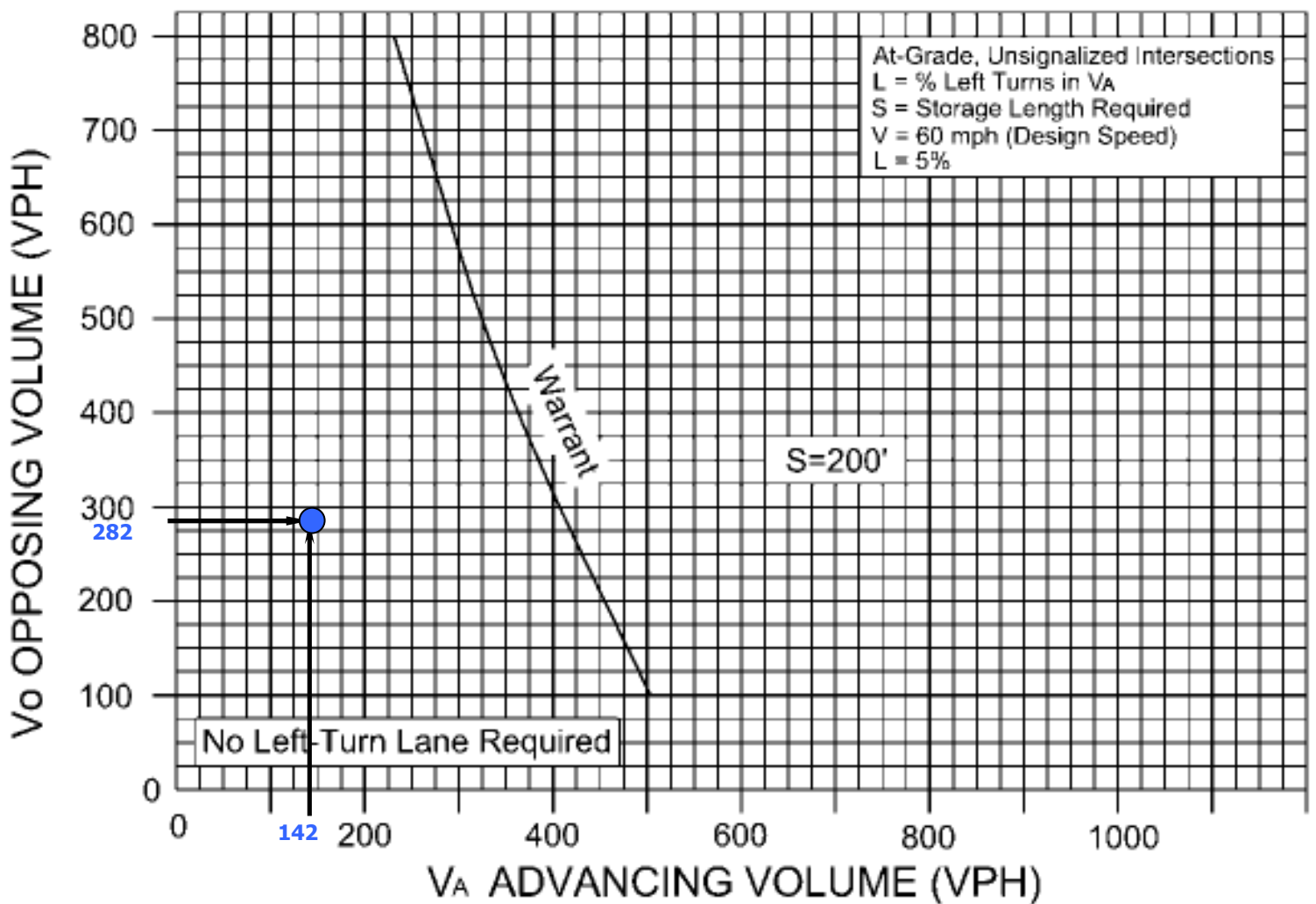


Results:
Westbound Right Turn Lane Warranted

**WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (60 MPH)
FIGURE 3-18 VDOT ROAD DESIGN MANUAL APPENDIX F**



WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (60 MPH)
FIGURE 3-17 VDOT ROAD DESIGN MANUAL APPENDIX F

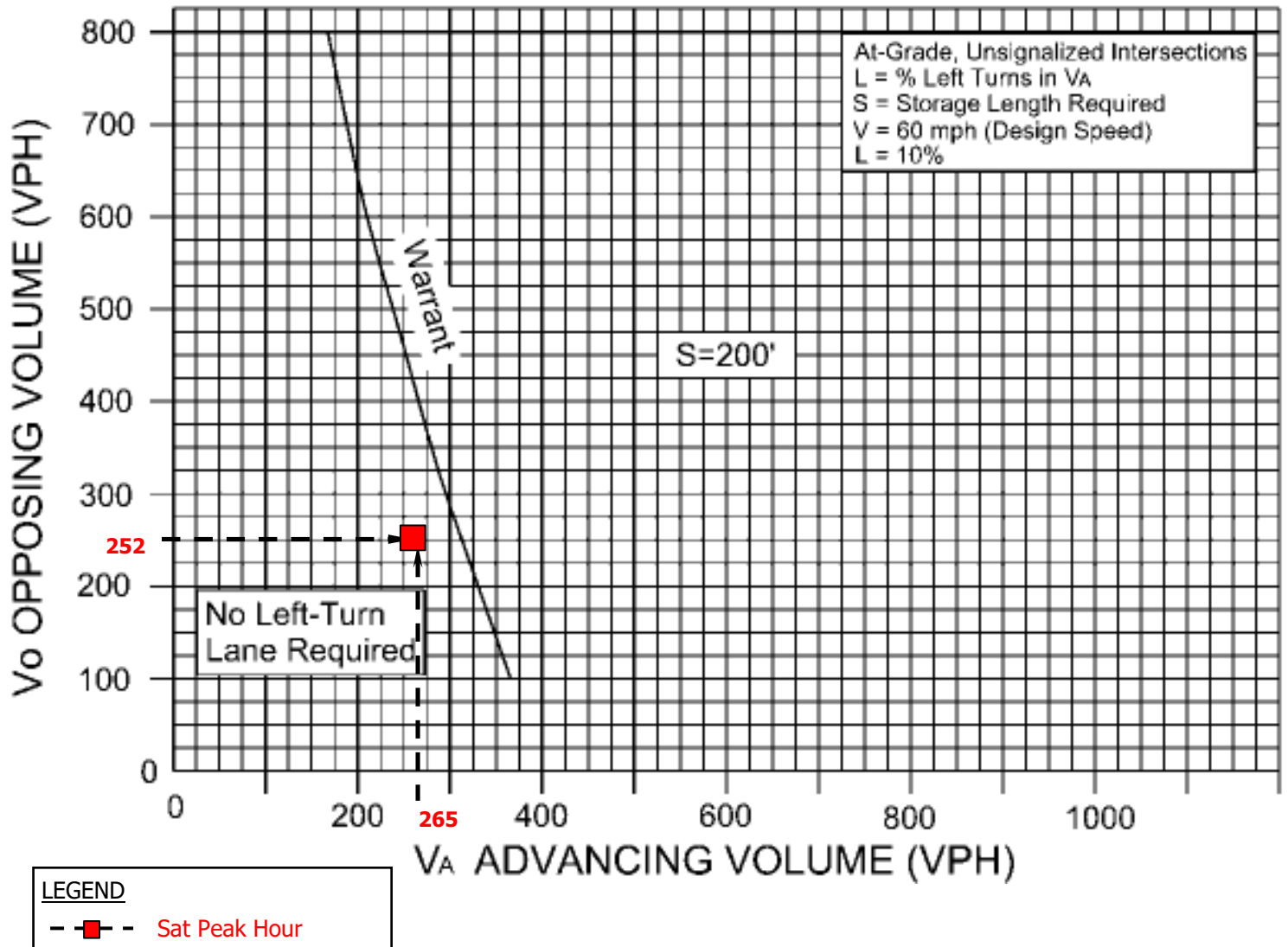


Results:
Eastbound Left Turn Lane Not Warranted

LEGEND

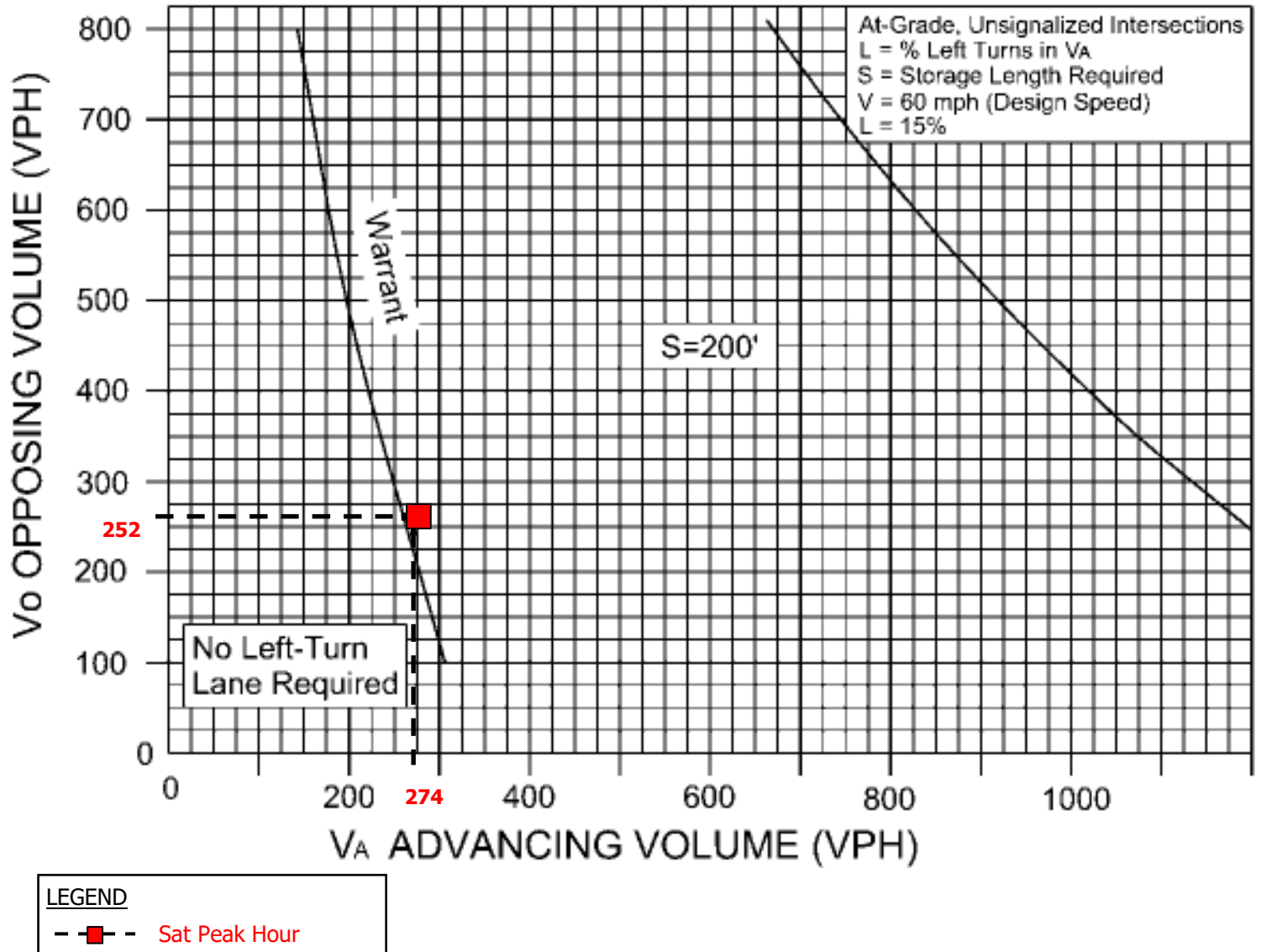
—●— PM Peak Hour

WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (60 MPH)
FIGURE 3-18 VDOT ROAD DESIGN MANUAL APPENDIX F



Results:
Eastbound Left Turn Lane Not Warranted

**WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (60 MPH)
FIGURE 3-19 VDOT ROAD DESIGN MANUAL APPENDIX F**



Results:
Eastbound Left Turn Lane Not Warranted

APPENDIX A

Traffic Count Data

Peggy Malone & Associates

(888) 247-8602

File Name : Chickahominy Riverfront Park & John Tyler Highway SAT
 Site Code :
 Start Date : 4/17/2021
 Page No : 1

Groups Printed- Cars

	Chickahominy Riverfront Park Southbound				John Tyler Hwy Westbound				John Tyler Hwy Eastbound				
Start Time	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Int. Total
12:00 PM	1	3	19	23	7	46	0	53	35	2	0	37	113
12:15 PM	2	3	16	21	2	44	0	46	42	3	0	45	112
12:30 PM	0	5	12	17	9	42	0	51	46	2	0	48	116
12:45 PM	2	4	21	27	6	34	0	40	61	1	0	62	129
Total	5	15	68	88	24	166	0	190	184	8	0	192	470
01:00 PM	0	13	11	24	6	39	0	45	42	6	0	48	117
01:15 PM	4	7	13	24	12	37	0	49	32	2	0	34	107
01:30 PM	3	10	12	25	8	24	0	32	52	10	0	62	119
01:45 PM	0	10	21	31	8	28	0	36	47	2	0	49	116
Total	7	40	57	104	34	128	0	162	173	20	0	193	459
Grand Total	12	55	125	192	58	294	0	352	357	28	0	385	929
Apprch %	6.2	28.6	65.1		16.5	83.5	0		92.7	7.3	0		
Total %	1.3	5.9	13.5	20.7	6.2	31.6	0	37.9	38.4	3	0	41.4	

	Chickahominy Riverfront Park Southbound				John Tyler Hwy Westbound				John Tyler Hwy Eastbound				
Start Time	Right	Left	App. Total		Right	Thru	App. Total		Thru	Left	App. Total		Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 12:45 PM													
12:45 PM	2	4	6		6	34	40		61	1	62		108
01:00 PM	0	13	13		6	39	45		42	6	48		106
01:15 PM	4	7	11		12	37	49		32	2	34		94
01:30 PM	3	10	13		8	24	32		52	10	62		107
Total Volume	9	34	43		32	134	166		187	19	206		415
% App. Total	20.9	79.1			19.3	80.7			90.8	9.2			
PHF	.563	.654	.827		.667	.859	.847		.766	.475	.831		.961

Peggy Malone & Associates

(888) 247-8602

File Name : Chickahominy Riverfront Park & John Tyler Highway SAT
 Site Code :
 Start Date : 4/17/2021
 Page No : 1

Groups Printed- Trucks

	Chickahominy Riverfront Park Southbound				John Tyler Hwy Westbound				John Tyler Hwy Eastbound				
Start Time	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Int. Total
12:00 PM	0	0	0	0	0	3	0	3	2	0	0	2	5
12:15 PM	0	0	0	0	0	2	0	2	1	0	0	1	3
12:30 PM	0	1	0	1	1	2	0	3	3	0	0	3	7
12:45 PM	0	0	0	0	0	1	0	1	2	0	0	2	3
Total	0	1	0	1	1	8	0	9	8	0	0	8	18
01:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
01:15 PM	0	0	0	0	1	1	0	2	2	0	0	2	4
01:30 PM	0	1	0	1	0	0	0	0	0	0	0	0	1
01:45 PM	0	1	0	1	0	1	0	1	1	0	0	1	3
Total	0	2	0	2	1	3	0	4	3	0	0	3	9
Grand Total	0	3	0	3	2	11	0	13	11	0	0	11	27
Apprch %	0	100	0		15.4	84.6	0		100	0	0		
Total %	0	11.1	0	11.1	7.4	40.7	0	48.1	40.7	0	0	40.7	

	Chickahominy Riverfront Park Southbound			John Tyler Hwy Westbound			John Tyler Hwy Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	0	0	0	0	3	3	2	0	2	5
12:15 PM	0	0	0	0	2	2	1	0	1	3
12:30 PM	0	1	1	1	2	3	3	0	3	7
12:45 PM	0	0	0	0	1	1	2	0	2	3
Total Volume	0	1	1	1	8	9	8	0	8	18
% App. Total	0	100		11.1	88.9		100	0		
PHF	.000	.250	.250	.250	.667	.750	.667	.000	.667	.643

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(888) 247-8602

File Name : Chickahominy Riverfront Park & John Tyler Highway SAT
 Site Code :
 Start Date : 4/17/2021
 Page No : 1

Groups Printed- Combined

	Chickahominy Riverfront Park Southbound				John Tyler Hwy Westbound				John Tyler Hwy Eastbound				
Start Time	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Int. Total
12:00 PM	1	3	19	23	7	49	0	56	37	2	0	39	118
12:15 PM	2	3	16	21	2	46	0	48	43	3	0	46	115
12:30 PM	0	6	12	18	10	44	0	54	49	2	0	51	123
12:45 PM	2	4	21	27	6	35	0	41	63	1	0	64	132
Total	5	16	68	89	25	174	0	199	192	8	0	200	488
01:00 PM	0	13	11	24	6	40	0	46	42	6	0	48	118
01:15 PM	4	7	13	24	13	38	0	51	34	2	0	36	111
01:30 PM	3	11	12	26	8	24	0	32	52	10	0	62	120
01:45 PM	0	11	21	32	8	29	0	37	48	2	0	50	119
Total	7	42	57	106	35	131	0	166	176	20	0	196	468
Grand Total	12	58	125	195	60	305	0	365	368	28	0	396	956
Apprch %	6.2	29.7	64.1		16.4	83.6	0		92.9	7.1	0		
Total %	1.3	6.1	13.1	20.4	6.3	31.9	0	38.2	38.5	2.9	0	41.4	

	Chickahominy Riverfront Park Southbound			John Tyler Hwy Westbound			John Tyler Hwy Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:15 PM										
12:15 PM	2	3	5	2	46	48	43	3	46	99
12:30 PM	0	6	6	10	44	54	49	2	51	111
12:45 PM	2	4	6	6	35	41	63	1	64	111
01:00 PM	0	13	13	6	40	46	42	6	48	107
Total Volume	4	26	30	24	165	189	197	12	209	428
% App. Total	13.3	86.7		12.7	87.3		94.3	5.7		
PHF	.500	.500	.577	.600	.897	.875	.782	.500	.816	.964

Peggy Malone & Associates

(888) 247-8602

File Name : Chickahominy Riverfront Park & John Tyler Highway
 Site Code :
 Start Date : 4/15/2021
 Page No : 1

Groups Printed- Cars

	Chickahominy Riverfront Park Southbound				John Tyler Hwy Westbound				John Tyler Hwy Eastbound				
Start Time	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	1	2	8	11	1	31	0	32	33	0	0	33	76
04:15 PM	0	3	1	4	3	33	0	36	28	0	0	28	68
04:30 PM	0	1	4	5	3	39	0	42	28	0	0	28	75
04:45 PM	0	5	4	9	5	38	0	43	28	0	0	28	80
Total	1	11	17	29	12	141	0	153	117	0	0	117	299
05:00 PM	0	3	5	8	4	35	0	39	31	0	0	31	78
05:15 PM	1	4	2	7	28	36	0	64	28	0	0	28	99
05:30 PM	0	32	5	37	4	48	0	52	27	0	0	27	116
05:45 PM	2	3	7	12	4	18	0	22	24	1	0	25	59
Total	3	42	19	64	40	137	0	177	110	1	0	111	352
Grand Total	4	53	36	93	52	278	0	330	227	1	0	228	651
Apprch %	4.3	57	38.7		15.8	84.2	0		99.6	0.4	0		
Total %	0.6	8.1	5.5	14.3	8	42.7	0	50.7	34.9	0.2	0	35	

	Chickahominy Riverfront Park Southbound			John Tyler Hwy Westbound			John Tyler Hwy Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	0	5	5	5	38	43	28	0	28	76
05:00 PM	0	3	3	4	35	39	31	0	31	73
05:15 PM	1	4	5	28	36	64	28	0	28	97
05:30 PM	0	32	32	4	48	52	27	0	27	111
Total Volume	1	44	45	41	157	198	114	0	114	357
% App. Total	2.2	97.8		20.7	79.3		100	0		
PHF	.250	.344	.352	.366	.818	.773	.919	.000	.919	.804

Peggy Malone & Associates

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File Name : Chickahominy Riverfront Park & John Tyler Highway
 Site Code :
 Start Date : 4/15/2021
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Groups Printed- Trucks

	Chickahominy Riverfront Park Southbound				John Tyler Hwy Westbound				John Tyler Hwy Eastbound				
Start Time	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	3	0	3	0	0	0	0	3
04:15 PM	0	0	0	0	0	3	0	3	2	0	0	2	5
04:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	7	0	7	2	0	0	2	9
05:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	3	0	3	0	0	0	0	3
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	4	0	4	0	0	0	0	4
Grand Total	0	0	0	0	0	11	0	11	2	0	0	2	13
Apprch %	0	0	0		0	100	0		100	0	0		
Total %	0	0	0	0	0	84.6	0	84.6	15.4	0	0	15.4	

	Chickahominy Riverfront Park Southbound			John Tyler Hwy Westbound			John Tyler Hwy Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	0	3	3	0	0	0	3
04:15 PM	0	0	0	0	3	3	2	0	2	5
04:30 PM	0	0	0	0	1	1	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	7	7	2	0	2	9
% App. Total	0	0		0	100		100	0		
PHF	.000	.000	.000	.000	.583	.583	.250	.000	.250	.450

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File Name : Chickahominy Riverfront Park & John Tyler Highway
 Site Code :
 Start Date : 4/15/2021
 Page No : 1

Groups Printed- Combined

	Chickahominy Riverfront Park Southbound				John Tyler Hwy Westbound				John Tyler Hwy Eastbound				
Start Time	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	1	2	8	11	1	34	0	35	33	0	0	33	79
04:15 PM	0	3	1	4	3	36	0	39	30	0	0	30	73
04:30 PM	0	1	4	5	3	40	0	43	28	0	0	28	76
04:45 PM	0	5	4	9	5	38	0	43	28	0	0	28	80
Total	1	11	17	29	12	148	0	160	119	0	0	119	308
05:00 PM	0	3	5	8	4	36	0	40	31	0	0	31	79
05:15 PM	1	4	2	7	28	36	0	64	28	0	0	28	99
05:30 PM	0	32	5	37	4	51	0	55	27	0	0	27	119
05:45 PM	2	3	7	12	4	18	0	22	24	1	0	25	59
Total	3	42	19	64	40	141	0	181	110	1	0	111	356
Grand Total	4	53	36	93	52	289	0	341	229	1	0	230	664
Apprch %	4.3	57	38.7		15.2	84.8	0		99.6	0.4	0		
Total %	0.6	8	5.4	14	7.8	43.5	0	51.4	34.5	0.2	0	34.6	

	Chickahominy Riverfront Park Southbound			John Tyler Hwy Westbound			John Tyler Hwy Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	0	5	5	5	38	43	28	0	28	76
05:00 PM	0	3	3	4	36	40	31	0	31	74
05:15 PM	1	4	5	28	36	64	28	0	28	97
05:30 PM	0	32	32	4	51	55	27	0	27	114
Total Volume	1	44	45	41	161	202	114	0	114	361
% App. Total	2.2	97.8		20.3	79.7		100	0		
PHF	.250	.344	.352	.366	.789	.789	.919	.000	.919	.792

APPENDIX B

2021 Existing Conditions Analysis Reports

Intersection						
Int Delay, s/veh	2.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	125	177	79	84	2
Future Vol, veh/h	0	125	177	79	84	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	92	92	92	92	92
Heavy Vehicles, %	0	0	2	0	0	0
Mvmt Flow	0	136	192	86	91	2
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	278	0	-	0	371	235
Stage 1	-	-	-	-	235	-
Stage 2	-	-	-	-	136	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1296	-	-	-	634	809
Stage 1	-	-	-	-	809	-
Stage 2	-	-	-	-	895	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1296	-	-	-	634	809
Mov Cap-2 Maneuver	-	-	-	-	634	-
Stage 1	-	-	-	-	809	-
Stage 2	-	-	-	-	895	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		11.6		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1296	-	-	-	637	
HCM Lane V/C Ratio	-	-	-	-	0.147	
HCM Control Delay (s)	0	-	-	-	11.6	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.5	

Queuing and Blocking Report

Baseline

06/17/2021

Intersection: 3:

Movement	SB
Directions Served	LR
Maximum Queue (ft)	61
Average Queue (ft)	33
95th Queue (ft)	53
Link Distance (ft)	387
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

HCM 6th TWSC
3: Jamestown Road

06/17/2021

Intersection

Int Delay, s/veh 1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	217	182	46	50	8
Future Vol, veh/h	23	217	182	46	50	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	0	0	0
Mvmt Flow	25	236	198	50	54	9

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	248	0	0 509 223
Stage 1	-	-	- 223 -
Stage 2	-	-	- 286 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	1330	-	- 528 822
Stage 1	-	-	- 819 -
Stage 2	-	-	- 767 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1330	-	- 516 822
Mov Cap-2 Maneuver	-	-	- 516 -
Stage 1	-	-	- 801 -
Stage 2	-	-	- 767 -

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1330	-	-	-	544
HCM Lane V/C Ratio	0.019	-	-	-	0.116
HCM Control Delay (s)	7.8	0	-	-	12.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Queuing and Blocking Report Baseline

06/17/2021

Intersection: 3: Jamestown Road

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	54	60
Average Queue (ft)	6	29
95th Queue (ft)	29	52
Link Distance (ft)	894	387
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

APPENDIX C

Future Traffic Conditions Analysis Reports

Intersection						
Int Delay, s/veh	2.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	139	197	88	94	2
Future Vol, veh/h	4	139	197	88	94	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	92	92	92	92	92
Heavy Vehicles, %	0	0	2	0	0	0
Mvmt Flow	5	151	214	96	102	2
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	310	0	-	0	423	262
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	161	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1262	-	-	-	591	782
Stage 1	-	-	-	-	786	-
Stage 2	-	-	-	-	873	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1262	-	-	-	589	782
Mov Cap-2 Maneuver	-	-	-	-	589	-
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	873	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.3	0		12.4		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1262	-	-	-	592	
HCM Lane V/C Ratio	0.004	-	-	-	0.176	
HCM Control Delay (s)	7.9	0	-	-	12.4	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.6	

Queuing and Blocking Report

2026 PM

10/26/2021

Intersection: 3:

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	22	63
Average Queue (ft)	1	34
95th Queue (ft)	13	56
Link Distance (ft)	894	387
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

HCM 6th TWSC
3: Jamestown Road

06/17/2021

Intersection

Int Delay, s/veh 1.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	26	242	203	51	56	9
Future Vol, veh/h	26	242	203	51	56	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	0	0	0
Mvmt Flow	28	263	221	55	61	10

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	276	0	0 568 249
Stage 1	-	-	- 249 -
Stage 2	-	-	- 319 -
Critical Hdwy	4.1	-	- 6.4 6.2
Critical Hdwy Stg 1	-	-	- 5.4 -
Critical Hdwy Stg 2	-	-	- 5.4 -
Follow-up Hdwy	2.2	-	- 3.5 3.3
Pot Cap-1 Maneuver	1299	-	- 488 795
Stage 1	-	-	- 797 -
Stage 2	-	-	- 741 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1299	-	- 476 795
Mov Cap-2 Maneuver	-	-	- 476 -
Stage 1	-	-	- 777 -
Stage 2	-	-	- 741 -

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	13.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1299	-	-	-	504
HCM Lane V/C Ratio	0.022	-	-	-	0.14
HCM Control Delay (s)	7.8	0	-	-	13.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection: 3: Jamestown Road

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	57	2	63
Average Queue (ft)	6	0	30
95th Queue (ft)	31	2	54
Link Distance (ft)	894	798	387
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0
